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THE

JOURNAL OF BOTANY,

BRITISH AND FOREIGN.

EDITED BY

JAMES BRITTEN, K.S.G., F.L.S.,

SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM (NATURAL HISTORY).

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Directions to Binder.

Tabs. 394–396	to face page	49
Tab. 397	..	241
,, 398	,,	145
,, 399	..	289
,, 400	,,	337
Tabs. 401, 402	..	369
Tab. 403 (*Phyllactinia*, incorrectly numbered 402)	,,	449
,, 404 (*Xyris*, incorrectly numbered 403)	,,	497

Or all may be placed together at the end of the volume.

SUBSCRIPTIONS FOR 1899 ARE NOW DUE.

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CONTENTS.

	PAGE
The Bermuda Juniper and its Allies. By MAXWELL T. MASTERS, M.D., F.R.S., &c.	1
The Mosses of South Lancashire. By J. A. WHELDON	11
Radnorshire and Breconshire Plants. By the Rev. W. MOYLE ROGERS, F.L.S.	17
An Account of *Velezia*. By FREDERIC N. WILLIAMS, F.L.S.	25
Bibliographical Notes :— XVII. Steudel's 'Synopsis Plantarum Glumacearum.' By A. B. RENDLE, D. Sc., F.L.S.	33
Two New *Hieracium* Forms. By the Rev. AUGUSTIN LEY, M.A. ..	35
The Australian Flora	36
SHORT NOTES. — *Orchis cruenta* in Cumberland.—*Stellaria media*.—*Clasmatocolea cuneifolia* (Hook.) Spruce in Scotland.—*Cerastium arcticum* Lange. — *Habenaria viridis* var. *bracteata*. — *Rubus Bakeri*	37
NOTICES OF BOOKS :— Contributions towards a Cybele Hibernica. By NATHANIEL COLGAN, M.R.I.A., and REGINALD W. SCULLY, F.L.S. — Flora of the County Donegal. By HENRY CHICHESTER HART, B.A., F.L.S.	39
An Elementary Text-Book of Botany. By SYDNEY H. VINES, M.A., D. Sc., F.R.S.	41
Pflanzen-Geographie auf physiologischer Grundlage. Von Dr. A. F. W. SCHIMPER	43
Selected Papers from the Kew Bulletin	44
Articles in Journals	45
Book-Notes, News, &c.	46

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THE

JOURNAL OF BOTANY

BRITISH AND FOREIGN.

THE BERMUDA JUNIPER AND ITS ALLIES.

By Maxwell T. Masters, M.D., F.R.S.

Correspondent of the Institute of France.

Until comparatively recently some doubts have existed concerning the species of *Juniperus* found in the island of Jamaica and in the Bermudas respectively; and there has been a corresponding difference of opinion as to the nomenclature to be adopted. The difficulties of the case were primarily due to the absence from our herbaria, until quite lately, of any modern specimens of the tree native to Jamaica.

Another source of confusion has arisen from the polymorphism so constantly presented by certain species of juniper, etc.: thus there are the linear primordial leaves, which are free at the base, and spreading; and there are the adult leaves, closely appressed, ovate, acute, convex, and often glandular at the back. Between these two forms are others, intermediate in form, according to the age of the shoot and its rate of growth. A particular tree, or more frequently a particular branch, may, as is well known, produce only primordial, spreading leaves, or only imbricate scale-like leaves; or, again, both forms may coexist on the same branch with or without intermediate forms.

The receipt of excellent specimens of the Bermuda juniper through the kindness of Mr. Haycock, as well as of equally satisfactory specimens of the Jamaica species with which I have been favoured by Mr. Fawcett, induces me to offer a few remarks on the history and position of the two trees.

In the first place, it is obvious from the comparison of the specimens from the two islands that the Bermuda tree, generally called *Juniperus bermudiana*, is quite distinct, alike from the species growing on the mountains of Jamaica and from that (now universally known as *J. virginiana*) which occurs from New Brunswick to Florida on the eastern side of the United States, whilst the same or representative forms occur in the Rocky Mountains of Colorado, in British Colombia, and southward in Texas and New Mexico. Extending over so vast an area, exposed to widely different environ-

ment, it is no matter for surprise that the species presents much variation. Many of these variations are in cultivation in this country, and are among the most elegant of hardy Conifers.

The history of the Bermuda tree has been sketched by Mr. Hemsley in the *Gardeners' Chronicle* for May 26, 1883, p. 656,* and in the Report on the Botany of the 'Challenger' Expedition. The name *bermudiana* has been adopted by Mr. Hemsley; but whether the tree is really the original *J. bermudiana* of Linnæus is open to question, as will be shown hereafter.

Of the Jamaica plant, at the time Mr. Hemsley originally wrote, there were no specimens at Kew, though specimens existed in the Sloane Collection in the British Museum. This West Indian species was referred by Grisebach (*Flora of the British West India Islands* (1864), p. 503) to *J. barbadensis* of Linnæus. Leaving for the moment the question of nomenclature, it may be repeated that an examination of Mr. Fawcett's specimens leaves no doubt that the Jamaica tree is specifically distinct from that of Bermuda. Moreover, as suggested by Mr. Hemsley and others, it is, in spite of some variation in habit, specifically identical with the *J. virginiana* of the main land.

There seem, therefore, to be only two species. One is Bermudan, and known as a cultivated plant in the Azores, Antigua (*De Ponthieu*!), and Saint Helena. Possibly the same species may occur in Jamaica and other West Indian islands, but there is at present no adequate evidence on this point. The other species, *J. virginiana* L., is, as has been said, distributed over a vast area in the United States, and has long been known as an inhabitant of the Blue Mountains of Jamaica. It occurs also, as seems most likely, in Cuba (*Wright*, 3187!), in the Bahamas (*Eggers*, 4358!), and in Antigua.†

Three specific names have been allotted to these two species. Although a matter of less importance than the determination of the species, it is nevertheless of much consequence to come to a decision concerning the names to be given to them. A brief summary of the history of the plants will facilitate the unravelling of the tangled synonymy, and aid us in the adoption of the most appropriate nomenclature.

The Bermudas, or Sommers' Islands, were discovered in 1515. In some of the records of the early voyages mention is made of the "cedar" that then, as now, was very common in the island; thus it is recorded that in 1593 one Henry May was shipwrecked on the north-west part of the Isle of Bermuda. May, as cited by Hemsley, *l. c.*, describes the island as covered with woods, but "Cedar is the chiefest." It will be noted that at that time cedars and junipers were not considered as separate genera.

In 1609 S. Jourdan was also wrecked on the same island. He speaks of an "infinite number of cedar trees (the fairest I thinke in

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* See also Journ. Bot. 1883, 250–260.

† Prof. Sargent *in litt.* inclines to the view that the Florida form of *virginiana* is identical with the Jamaica species, and sufficiently distinct to constitute a separate species.

the world), and these bring forth a very sweet berry and wholsome to eat." In 1611 the islands were colonized from Virginia, the establishment of which latter colony dates only from 1607. Clearly the cedar existed in Bermuda ages before the island was settled from Virginia.

The earliest mention in any botanical book of the West Indian junipers, so far as has been yet discovered, is in Parkinson's *Theatrum* (1640), p. 1029, though it may be inferred, from what he says, that the trees were already fairly well known. Parkinson gives no figure, and only the following brief mention:—"Juniperus major Americana, West Indian Cedar or Juniper.—This tree which they of our English colonies in the Bermuda and Virginia etc. call Cedar." It seems, then, that from the very first the Bermuda and the Virginian trees were confounded one with the other.

The next reference we meet with is in Paul Hermann's Hort. Acad. Lugd. Bat. Catalogus (1687), p. 345. Here the tree is called *Juniperus Bormudiana*, and we are told that it grew in England from seeds "ex Bormudos Insula delatis." A description and a figure are given in which one kind of foliage only, the primordial, is represented. The berries are represented as globose, and described as being as large as hazel nuts. There can be no doubt that the size of the fruit is exaggerated both in the description and in the illustration; nevertheless it is certain that the globose berries in the Bermudan plant are generally, if not always, considerably larger than the ovoid ones of the Virginian species.

Following the chronological sequence, we come now to Ray's *Historia Plantarum*, vol. ii. (1688), Dendrologia, p. 1413. Here we find the two species treated of as one under Parkinson's name. "*Juniperus major Americana* Park. *Cedrus Americana vulgo dicta.* Juniperus virginiana et barbadensis. Nostratibus The cedar of Virginia, Bermudas, Barbados. . . . ." A short description is given, in which the leaves are said to be very like those of the common juniper, but smaller, and the berries small. As to the locality, Ray says "multis Americæ locis provenit *v. g.* Virginia, Bermuda, Jamaica, Barbados." Ray considered that there were no differences between the tree of the mainland and that of the islands, except such as were due "accidentibus nonnullis a loci natalis diversitate ortis." Here we see Ray taking what is now called a "broad view" of species, and in modern fashion appreciating the influence of the "environment." Nevertheless he quotes from Hermann the description of both *J. bermudiana* and *J. virginiana*.

In Plukenet's *Almagestum* (1696), p. 201,* mention is made of two forms, one "*Juniperus Virginiana* Cupressi foliis rarioribus acutis Sabinam redolens," and the other "*Juniperus Barbadensis* Cupressi folio, ramulis quadratis. Savin or Cypress tree nostratibus dicta. Phytogr. t. 197, f. 4. Juniperus fortè major Americana, *Parkinson Theatr.* 1029. Vastæ magnitudinis est hujus [*sic*] Arbor ut et aliorum relatu nos monuit D. Jacobus Petever." Plukenet's figure,

* See Journ. Bot. 1883, 259, footnote.

above referred to, resembles *J. bermudiana* in its four-cornered branchlets, but no fruit is shown, and its identification is doubtful. Plukenet also refers to Hermann's *J. bermudiana* above mentioned—to "Juniperus e Terra Mariana" and to "J. Caroliniana Thuyæ ramulis fusis." Phytog. tab. 40, f. 9. All these are probably referable to *J. virginiana*.

In the *Mantissa* (1700), p. 109, Plukenet has "Juniperus Barbadensis, Cupressi folio Arbor præcelsa, tetragonophyllos, sive foliaturâ quadrangulari," and he then, with extraordinary disregard to name and locality, asks the question, "An Juniperus arbor Sacrorum Bibliorum?"; possibly, however, not referring specially to the American species. In the *Amaltheum Botanicum* (1705), p. 125, he has "Juniperus Barbadensis Cupressi folio, ramulis quadratis; Almag, Bot. 201." To this the following localities are assigned: "regnum Congianum," Ind. Or., Terceira, Andes of New Spain. "provenit etiam in Virginia et Florida."

Plukenet's plants are preserved in the Sloane collections at the British Museum. Among them we find one of *J. bermudiana* with dimorphic foliage (H. S. 100, 154 & 96, 121). Another specimen (H. S. 83, fol. 38), obtained from the garden of Mr. Edward Morgan in Westminster, is doubtless *J. virginiana* with primordial foliage only. A third specimen in the "Herbarium vivum Plukenetianum" (H. S. 91, fol. 51), which is inscribed "Cedrus Juniperus Insulæ Bermudæ, R. H. 1414," is *J. communis* L. From all this it seems that the "Queen's Botanist" must, like his successors, have been somewhat confused with these junipers.

At about the same date are specimens in the Sloane Herbarium from Banister, to which my attention has been called by Mr. Britten, to whose courtesy I am indebted for the opportunity of inspecting many of these older specimens of whose existence I should otherwise have been unaware. Banister has two specimens, one labelled "Juniperus s. Cedrus Novæ Angliæ an Sabina foliis Cupressi altera C. B. P. etc." This has primordial foliage only, but is doubtless referable to *J. virginiana*, as is likewise a second specimen (H. S. 168, fol. 88) called "Cedrus virginiana"; this also has only acicular leaves.

In Petiver's "Botanicum hortense Indicum," a collection of garden plants, is a specimen (H. S. 76, fol. 35) inscribed as follows:—"Bermuda Cedar. I have it elsewhere in fruit from that very island, and is a true Juniper, R. H. 1414." This is the true *Juniperus bermudiana* L. The exact date of this specimen cannot be assigned.

A similar remark applies to the "collection of plants gathered and dried by order of Mary Dutchess of Beaufort and given by her to Sir Hans Sloane." In vol. iv. of this collection (Herb. Sloane 133), fol. 60, the "Cedar of Burmuda" with subulate intermediate foliage only, appears to be *J. virginiana*. In vol. x. fol. 5 (H. S. 139), is a specimen inscribed with Parkinson's name, "Juniperus major Americana. West Indian Cedar or Juniper, Cedar of Virginia." This is *J. virginiana* with primordial foliage only. In another volume (H. S. 235, fol. 16) are specimens of "Cedar of

Burmudas" with primordial foliage only, of "Cedar of Virginia," also with primordial foliage.

In 1720 Boerhaave, in his *Index alter plantarum* (ii. 208), has the following species:—

"3. Juniperus; Bormudiana H.L. 345. Cedrus Bormudiana, vulgo.

4. Juniperus; Virginiana H.L. 345. Folio ubique juniperino. Cedrus Virginiana vulgo. . ."

5. Juniperus; Virginiana; foliis inferioribus juniperinis, superioribus Sabinam vel Cypressum referentibus. *Juniperus virginiana* . . . . Plukn. Alm. 201; *Juniperus Virginiana & Barbadensis* Raj. H. 1413. Rami huic penduli.

6. Juniperus; Virginiana ramis intortis pendulis expansis folio toto juniperino."

In Boerhaave's Hortus siccus (H. S. 32, fol. 135) is a specimen with very densely set primordial foliage, with the inscription. "Juniperus Bormudiana Herm. Catal. ex horto curiosissimi D. Philippi de Flind." This is probably the true Bermuda plant, the primordial foliage of which is often, but not invariably, densely set as in the specimen just referred to.

In Sloane's "Voyage . . . to Barbados . . . . and Jamaica," ii. p. 2 (1725), we get more satisfactory evidence in the shape of descriptions and figures, and Sloane's specimens are in his herbarium at the British Museum. Sloane's description runs thus:—"J. maxima Cupressi folio minimo, cortice exteriore in tenues philyras spirales ductili Cat. p. 128, tab. 157, fig. 3." The figure with imbricate leaves and the corresponding specimen in the herbarium (vol. v. fol. 51) show conclusively that one of the Jamaica plants collected by Sloane is what we now call *J. virginiana*. Sloane quotes with donbt the Juniperus barbadensis Cupressi folio of Plukenet's *Mantissa*, p. 109.

What is specially interesting from our present point of view is the specimen on fol. 52 of the same volume of the Sloanean herbarium. It is labelled "Præcedentis varietas?" "Juniperus barbadensis cupressi folio ramulis quadratis savin aut *Cypress tree* nostratibus dicta. Pluk. Phytograph. t. 197, fig. 5 (*sic*)." This specimen corresponds, so far as it goes, with *J. bermudiana*, and, if so, it would appear either that that species occurs in Jamaica, as well as in Bermuda, or that Sloane obtained his specimen from the last-named island, of which there is no evidence.

In the British Museum Herbarium is also a specimen from the Bahamas from Francis Dale (1730); this is *J. virginiana*.

Philip Miller, in the first edition of the *Gardener's Dictionary* (1731), mentions our plants in the following terms:—

"3. *Juniperus Virginiana*, H.L. folio ubique Juniperino. Boerh. Ind. The Cedar of Virginia." This must have been the form with primordial foliage only. Miller's No. 4 had both kinds of foliage. "*Juniperus Virginiana* foliis inferioribus Juniperinis, superioribus Sabinam vel Cypressum referentibus. Boerh. Ind. Red Virginian Cedar." Miller's n. 6 is

"*Juniperus Bermudiana*, H.L. The Cedar of Bermudas. . . . .

The Bermudas Cedar coming from a more temperate climate is somewhat more tender than the former and more impatient of our cold (especially while the plants are young), but afterwards it endures it very well, as may be seen by divers trees which are now growing in England, some of which are upwards of twenty feet high and have resisted several severe winters without injury." Further reference to Miller's plants will be made under the head of his 8th edition.

In the *Hortus Cliffortianus* (1737), p. 464, Linnæus gives a description of *J. virginiana* with the two kinds of foliage. Plukenet's *barbadensis* ("Almagest. 201, t. 197, f. 4, mala") is cited as synonymous, as also the plant described in Plukenet's *Mantissa*, 109, previously mentioned. The "*Juniperus maxima*," &c., of Sloane and of Ray are also referred here. The localities given are, "Virginia, Carolina aliisque Americæ præsertim septentrionalis regionibus." Two specimens in the British Museum from Hort. Cliffort. labelled "*Juniperus barbadensis virginiana*" are referable to what we now call *J. virginiana*.

In the first edition of the *Species Plantarum* (1753), p. 1039, we find three species briefly described in the following order. The descriptive phrases, with such only of the synonymy as is requisite, are here cited :—

"*J. barbadensis;* J. foliis omnibus quadrifariam imbricatis, unioribus ovatis, senioribus acutis. Hort. Angl. t. 1, f. 1.

"*J. bermudiana;* foliis inferioribus ternis, superioribus binis decurrentibus subulatis patulis acutis. Roy. lugd. Bat. 90. J. bermudiana, Herm. Lugd. B. 345, t. 347.

"*J. Virginiana;* foliis ternis basi adnatis : junioribus imbricatis, senioribus patulis." Hort. Cliff. 464, Roy. lugd. B. 90. Gron. Virg. 194. Juniperus major Americana, Ray Hist. 1413, 1414. Juniperus maxima, cupressi folio minimo, cortice exteriore in tenues philyras spirales ductili. Sloane Jam. 128. Hist. 2, p. 2, t. 157, f. 3. Ray Dend. 12."

In Gmelin's edition of the *Systema*, ii. p. 1004, the description of *J. virginiana* is given differently, as follows :—"J. Virginiana foliis ternis omnibus patentibus. Du Roi, harbk. Baumz, 1, p. 346."

These descriptions are, unfortunately, not adequate, in the present state of our knowledge, to enable us to allot them with precision. That of *J. barbadensis* most nearly corresponds with the Bermudan species as we now know it.

An examination of the specimens in Linnæus's herbarium does not throw much light on the question, for the specimens do not in all cases tally with the descriptions, and no localities are indicated. "*J. bermudiana*" of the herbarium is a form with primordial leaves only, each leaf being linear-acute, about 9 mm. long. The specimen is not sufficient to justify us in allotting it to what we now call *Bermudiana*, as it may be a form of *J. Virginiana*.

"*J. barbadensis*" of the herbarium has tetragonal branchlets and densely packed foliage, the individual leaves being all subulate-acute, and provided with a small dorsal gland near the base.

There can be no doubt that this specimen may be referred to what we now call *J. Virginiana*.

"*J. Virginiana*" has loosely disposed ramification with two forms of foliage, the primordial leaves spreading, about 1 cm. long, linear, pointed, with a small gland at the base. The cauline leaves are much smaller, appressed, deltoid-ovate, subacute, with a dorsal gland.

So far, then, as the Linnean specimens permit us to form an opinion, it may be said that "*bermudiana*" cannot certainly be identified, and that "*barbadensis*" and "*virginiana*," though differing in habit, are forms of one and the same species,—that now generally known by the latter name.

In 1756 Patrick Browne issued his *Natural History of Jamaica*. At p. 362 we find the following reference, which we quote on account of the doubt therein expressed as to the identity of the plant:—"Juniperus foliolis inferioribus ternis, superioribus binis decurrentibus patulis. L. Sp. Pl. an potius. Juniperus foliolis omnibus quadrifariam imbricatis; junioribus ovatis senioribus acutis. Roy. et L. Sp. Pl. The Bermudas Cedar. This is a native of Jamaica, and grows very plentifully in most of the Blue Mountains." Browne, therefore, like most of his predecessors and successors, confounded the Jamaican and the Bermudan species.

In the eighth edition (1768) of Miller's *Gardener's Dictionary* we find—

"3. *Juniperus* (*Virginiana*) foliis ternis omnibus patentibus .... Juniperus Virginiana. H. L. Folio ubique juniperino. Boerh. Ind. Cedar of Virginia, or Red Cedar.

"4. *Juniperus* (*Caroliniana*) foliis ternis basi adnatis, junioribus imbricatis, senioribus patulis. Hort. Cliff. 464 .... Juniperus Virginiana, foliis inferioribus juniperinis, superioribus sabinam vel cypressum referentibus. Boerh. Ind. Carolina Cedar.

"5. *Juniperus* (*Bermudiana*) foliis inferioribus ternis, superioribus quadrifariam imbricatis .... Juniperus Bermudiana. H. L. Cedar of Bermudas. ....

"9. *Juniperus* (*Barbadensis*) foliis omnibus quadrifariam imbricatis junioribus ovatis, senioribus acutis. Prod. Leyd. 90. .... Juniperus maxima cupressi folio minimo, cortice exteriore in tenues philyras spiralis [sic] ductili. Sloan. Cat. Jam. 128. .... Jamaica Berry-bearing Cedar."

Miller's types are preserved in the British Museum, and on examining them I find No. 3, inscribed *J. Virginiana*, to be a form with primordial leaves only, but probably correctly referred to *J. Virginiana*. No. 4, *J. caroliniana*, has, as described, dimorphic foliage, and is referable to *J. virginiana*. No. 5 was called by Miller *J. Bermudiana*, and was so considered by Mr. Carruthers, but on the whole it has more of the appearance of *J. virginiana*. No. 9, inscribed *J. barbadensis*, has adult foliage, and is no doubt *Juniperus virginiana*.

With reference to the Bermuda Cedar, Miller somewhat modifies what he had said in the first edition; he now says, "There are few trees in England of any great size, although I

have received very fine specimens from Bermudas." He goes on to say that the trees are destroyed in winter when they are not sheltered. A page or two further on Miller mentions the Bermudas Cedar as a native of the Bahamas, but it is possible that this was a slip of the pen, or that the Virginian Cedar was really meant, as there is no other evidence of the existence of the Bermudan species in the Bahamas. Of *J. barbadensis* he says: "This sort is generally confounded with the Bermudas Cedar, and taken for the same, but the specimens of it which were sent me by the late Dr. Houstoun prove them to be different trees."

The Jamaica Berry-bearing Cedar mentioned as No. 9, and concerning which Sloane's Catalogue is cited, grows, according to Miller, in Jamaica, and also in the other islands of the West Indies. This, he goes on to say, "is generally confounded with the Bermudas Cedar and taken for the same; but the specimens of it which were sent to me by the late Dr. Houston prove them to be different trees."

Lunan (*Hortus Jamaicensis*, i. 83, 1814) quotes Sloane and Browne, and adds, "The Bermudas Juniper, commonly called Bermudas Cedar, is a native of Jamaica. . . . . It appears doubtful whether Sloane's tree be the same as Browne's, and, indeed, whether either of them be exactly the same species as the *bermudiana*."

In 1843 Sir William Hooker published in the *London Journal of Botany*, ii. 141, t. 1, an account, accompanied by a description, of *Juniperus bermudiana* of Linnæus from Bermudan specimens. Sir William figures both the spreading acicular and the imbricate ovate forms of foliage.

Endlicher (1847) included *barbadensis* under *virginiana*, and kept up *bermudiana* as distinct.

Grisebach (1864) cited *J. barbadensis* of Linnæus, referring to it *J. bermudiana* of Lunan (not of Linnæus), together with specimens from the Bahamas, Jamaica (Sloane), Antigua, and Barbados. These localities point to the conclusion that Grisebach's *barbadensis* is referable to *virginiana*.

Parlatore (1868) considered *barbadensis* and *bermudiana* to be two names for one and the same species, but which he considered different from *J. virginiana*.

Carrière (1855), Gordon (1858), Kent (Veitch, *Manual*, 1881), and Beissner (1891) all make two species,—*virginiana* and *bermudiana*. The three first named refer the *barbadensis* of Linnæus to *bermudiana*.

Sargent, in his *Silva of North America* (1896), treating of *J. virginiana*, gives a very full list of synonyms, but does not include among them the *barbadensis* of Linnæus, The *bermudiana* of the Swedish botanist is seemingly referred to as *J. virginiana* var. *bermudiana* of Vasey.

To complete our record of publications referring more or less directly to the Bermudan and to the West Indian species, we may again call attention to the publication of Mr. Hemsley's articles already mentioned. In the *Botany of the Challenger* (1884), p. 81, Mr

Hemsley gives fuller particulars concerning the history, and a good representation, tab. 5, of the Bermuda species. The fruits represented are considerably smaller than those sent me by Mr. Haycock.

Taking into consideration the foregoing historical details, the following synonymy is offered as representing the present state of our knowledge :—

J. BERMUDIANA, Linn. Sp. Plant. ed. i. 1039 (1753) ; W. Hooker, in London Journ. Bot. ii. 141, t. 1 (1843) ; Endlicher, Synopsis Conif. 29 (1847) ; Carrière, Traité Général, ed. 1, 49, partly (1855); Gordon, Pinetum (1858), and ed. 2. 141 (1875), partly ; Parlatore in DC. Prodr. xvi.² 490 (1868) ; Kent in Veitch, Manual, 285 (1881) ; Hemsley in Gard. Chron. May 26, 657 (1883), and in Journ. Bot. 1883, 259 ; Botany of 'Challenger,' 81 (1884), tab. v.; Beissner, Handbuch, 115 (1891); Sargent in Garden and Forest, June 24, c. ic. (1891).

? J. Virginiana, var. bermudiana, Vasey ex Sargent, Silva x. 23 (1896).

J. VIRGINIANA, Linn. Sp. Pl. ed. 1, 1039 (1753) ; Richard, Conif. 37, t. 6, f. 2 (1826) ; Loudon, Arboretum, 2495 (1838) ; Parlatore in DC. Prod. xvi.² 489 (1868) ; Koch, Dendrol. 2, 138 (1873) ; Wilkomm, Forstliche Flora 257 (1887) ; Sargent, Silva of N. America x. 93, tab. 524 (1896) ; Britton and Brown, Illust. Flora, N.U.S. i. 60, fig 133, et auctt. plurim.

J. barbadensis Linn. Sp. Plant. ed. 1, 1039 (1753) ; Grisebach, Flora of the West Indian Islands, 503 partly (1864).

J. bermudiana, Lunan, Hort. Jamaic. 83.

The plant known in gardens as *Biota meldensis* of Gordon is referred to *J. bermudiana* by Parlatore, but it is almost certainly a form of *Thuya* (§ *Biota*) *orientalis* with primordial or acicular foliage only. It is quite devoid of the characteristic juniperine odour.

It is curious to note that the true Bermuda Juniper, which is now seldom or ever met with in cultivation in this country, was grown here towards the end of the seventeenth century, for it is mentioned as having been grown from seeds received from England, in Hermann's Catalogue of the Leyden Garden (1687), and by Miller and Evelyn.

Juniperus virginiana, the so-called "Red Cedar," is mentioned in the same catalogue, and is said to have been introduced into cultivation by Evelyn. Evelyn's account, *Silva*, p. 125 (1679), is worth citing, not only as showing that the Bermudas tree was known to him, but that his knowledge was so little critical that he confounds both it and the Virginian "cedar" with the Cedar of Lebanon.

"The Cedar? which grows in all *extreams;* In the moist *Barbados*, the hot *Bermudas*, the cold *New-England;* even where the Snow lyes (as I am assur'd) almost half the year; (for so it does on *Mount Libanus*, from whence I have receiv'd *seed* of those few

remaining *Trees*). Why then it should not thrive in *Old England*, I conceive is from our want of *Industry*: It grows in the *Bogs* of *America*, and in the *Mountains* of *Asia*; it seems there is no place affrights it; I have frequently rais'd it of the *Seeds*, which I set like *Bay-berries*; and we might have of the very best kind in the *World*, from the *Summer Islands*, though now almost utterly exhausted *there* also, and so the most incomparable of that *sacred wood*, like to be quite *destroy'd* by our *negligence*, which is by nature almost *eternal*: But that which we have from *Barbadoes* and *Jamaica*, is a spurious sort, and of so porous a nature, as, that *Wine* will soak through it; yet that which they so call in *New-England*, is a lofty grower, which being saw'd into *Planks* makes excellent *flooring*, and *everlasting*: They shingle their houses with it, and use it in all their edifices: why have we not more of these *species* brought over amongst us both to plant and work out?"

The "Red Cedar" is quite hardy, and is represented in British gardens by several elegant varieties.

Another matter may be briefly referred to. In order to account for the presence of the juniper in the islands of Bermuda, it is conjectured that the seeds may have been transported from Florida or other points of the American coast. Long separation and adaptation to new conditions are assumed to have been among the factors in gradually bringing about the very marked difference that now exists between the "Red Cedar" of the mainland (*J. virginiana*) and the Bermuda Juniper (*J. bermudiana*). This is plausible enough, but it suggests the enquiry how it is that the Jamaica Juniper, though so much further from the North American Continent, is nevertheless indistinguishable from *J. virginiana?* The only explanation that suggests itself is that the Bermuda plant was transported from the mainland at a very much earlier period, and hence a much longer time may have been available for evolutionary changes than in the case of the Jamaica Juniper. These are interesting matters for speculation, but, in the absence of means of confirmation or refutation, have little practical importance.

It may be convenient to add a brief description of the Bermudan and of the Jamaican specimens kindly furnished by Mr. Haycock and Mr. Fawcett:—

J. BERMUDIANA; arbor, dense ramosa, ramulis confertis ascendentibus tetragonis; foliis adultis oppositis decussatis arcte quadrifariam imbricatis, singulis circa 2 mill. long. appressis linearioblongis subacutis dorso convexis glandulâ mediana lineari notatis; foliis caulinis a sese remotiusculis basi adnatis superne subulatoacuminatis; amentis masculis lineari-oblongis obtusis fere 1 cent. long.; antheris aurantiacis; fructu stipitato globoso purpureoaurantiaco, 6–7 mill. diam., seminibus 2–3.

Ex ins. Bermud. misit cl. Haycock!

The sap-wood is of a pale fawn-colour, and the heart-wood of a rich reddish brown.

J. VIRGINIANA; arbor diffusa, ramis laxiusculis, ramulis ultimis

gracilibus pinnatim dispositis subtetragonis; foliis adultis arcte appressis quadrifariam imbricatis, singulis circa 1 mill. long, convexis ovatis acutis glandula majuscula lineari munitis; foliis caulinis adnatis subulato-acuminatis ad 4 mill. long. parte superiore libera appressa vel patula; floribus masculis (in spec. Jamaic.) haud visis; fructu in stipitem foliosum imposito 4–5 mill. long. subgloboso vel ovoideo purpureo abortu 1-loculari, 1 spermo.

Jamaica. *Coll. W. Harris*!

THE MOSSES OF SOUTH LANCASHIRE.

By J. A. Wheldon.

Since the publication of my first list (pp. 133–140, *ante*) I have obtained much additional information from various sources. Through the kind help of Mr. G. A. Holt, I am able to add a large number of records, some of which I had previously held over as doubtful for various reasons; some now first published; and others, old records with which I was previously unacquainted. Amongst these latter are many from Buxton's *Botanical Guide*, 1849 (B. G.), which have frequently been repeated in the later Floras of the district by Grindon and Whitehead. Where these and similar corrections are necessary, I have bracketed the names of locality and collector, showing that the former was quoted in my previous list, but that a prior discoverer is now named. I am greatly indebted to Messrs. Holt and Cash for much advice and assistance in clearing up the history of some of the components of the Manchester Florula. To go fully into all the questions raised would be out of place in such a list as this, but they will have to be approached when a complete flora of the vice-county is attempted. I must also express my thanks to Miss Armitage (A.) and Mr. Horrell for aid freely rendered. Where no collector's name follows the locality, it has been added from my own observation, and for the determination or confirmation of some of these I have cordially to thank Messrs. Dixon, Bagnall, Slater, and Mons. Renauld. In some cases, where the stations given in my previous list were few or doubtful, also where the plants are extinct or liable to become so soon, I have given fresh localities; and I have, too, included some old records of plants no doubt now extinct, but which are historically interesting. Species not in my previous list are indicated by an asterisk. The number of records followed by H., and the many corrections enclosed in brackets, will indicate how large a share Mr. Holt has had in the preparation of the list; and the majority of the Wilsonian records have been supplied by Mr. James Cash.

Sphagnum cymbifolium Ehrh. Woolston Moss, *Wilson*. Whiteley Dean, *H.*; Pendle Hill!!—Var. *squarrosulum* N. & H. Whiteley Dean, *H.* Pendle Hill!!—**S. papillosum* Ldb. Rooley Moor,

Whiteley Dean, and Syke, *H.*—**S. subsecundum* Nees. Pendle Hill!!—Var. *contortum* Schp. Rooley Moor, *B. G.* Whiteley Dean, *H.* Bowlsworth, *Dearden* (*A.*). Netherton!!—Var. *obesum* Schp. Whiteley Dean, *H.*—*S. teres* *var. *squarrosulum* Warnst. Netherton!!—*S. squarrosum* Pers. Whiteley Dean, *Belfield*. Netherton!!—*S. acutifolium* *var. *læte-virens* Braith. Whiteley Dean, *Belfield*.—*S. fimbriatum* Wils. Whiteley Dean, *H.*—**S. intermedium* Hoffm. Pendle Hill!! Netherton!!—*S. cuspidatum* Ehrh. Woolston Moss, *Wilson*.—*Var. *majus* Russ. Rooley Moor and Whiteley Dean, *H.*!!—*Var. *falcatum* Russ. Whiteley Dean, *H.*!!—*Var. *plumosum* N. & H. Whiteley Dean and Rooley Moor, *H.*!! Netherton!!

Tetraphis pellucida Hedw. Near Bolton, *Percival & Rogers*.—**T. Browniana* Grev. Healey Thrutch, near Rochdale, *Wilson*. Rooley Moor, *B. G.* The Jumbles, Bolton, *Percival & Rogers*. Rivington, *Scholefield* (*A*).

Catharinea undulata var. *Haussknechtii* Dixon. I was able to supply Mr. Dixon with later specimens from near Walton, with apparently lateral setæ, the stem having lengthened by innovation at the apex, thus confirming the determination.—*C. crispa* James. (Cheetham Hill, *Wild*. Rochdale and Prestwich Clough, *H.*)

Polytrichum aloides *var. *Dicksoni* Wallm. Prestwich, *B. G.*—*P. nanum* Neck. Reddish, *B. G.* Mere Clough, *Percival*.—*P. gracile* Dicks. Clifton and Chat Moss, *B. G.* (Cheetham Hill, *H.*).

**Oligotrichum incurvum* Ldb. Rooley Moor, *G. B.*

Pleuridium axillare Ldb. Wilgrave and Hulme, near Warrington, *Wilson*. Levenshulme, *Rogers*. Whiteley Dean, *H.*—*P. subulatum* Rab. Gate Wharf, near Warrington, *Wilson*. Pilkington and Blackley, *B. G.*

Brachyodus trichodes Fürnr. Windy Bank, near Littleboro, *Wilson*.

Dichodontium pellucidum Schp. (Clifton and Bamford, *B. G.*)—Var. *fagimontanum* Schp. Pendle Hill!!—**D. flavescens* Ldb. Bamford, *B. G.* Pendle Hill!!

Dicranella heteromalla *var. *interrupta* B. & S. Sand-pit near Rainford!!—*D. cerviculata* Schp. Irlam Moss, *Cash* (*A.*).—*Var. *pusilla* Schp. With the type on Simmonswood Moss!! and at Kirby!—*D. secunda* Ldb. Radcliffe, *B. G.*—*D. rufescens* Schp. (Sailors-shore and Prestwich, *Hunt*. Boggart Hole and Rochdale, *H.*).—*D. Schreberi* Schp. Radcliffe and Irlam, *B. G.* Clifton Junction, *Percival*. Kersal Moor, *Wild*. (Bamford, *H.*).—*D. squarrosa* Schp. Healey Thrutch, *Wilson*. Ashworth Valley, *B. G.* Rooley Moor, *G. F.* Whiteley Dean, *H.*

Dicranoweissia cirrata Ldb. (Bamford, *H.*). Chatburn!!—*D. crispula* Ldb. This was found in the Rochdale locality given in G. F. by *Hobson*.

Campylopus flexuosus Brid. (Bamford, *H.*). Pendle Hill, with fruit!!—*C. pyriformis* Brid. Pendle Hill!!—*C. fragilis* B. & S. Whiteley Dean, *H.*—Forma *densus*. Botany Bay Wood, Astley, *Hunt*.

Dicranum scoparium *var. *orthophyllum* Brid. Pendle Hill !!, Hightown !!, and Simmonswood Moss !! — *Var. *turfosum* Milde. Pendle Hill !!—**D. majus* Turn. Bamford, *H.*

Leucobryum glaucum Schp. Mere Clough, *Percival.*

**Fissidens osmundioides* Hedw. Scoud Moor and Fo Edge, *Percival.* Whiteley Dean, *H.*—*F. adiantoides* Hedw. Netherton !! —*F. taxifolius* Hedw. Prestwich, *Percival.* Bamford, *Holt.*

Grimmia apocarpa vars. *rivularis* W. & M. and *gracilis* W. & M. Occasionally by the Ribble and its tributaries, from Preston to Clitheroe !!—*Rhacomitrium fasciculare* Brid. Pendle Hill !!—*Ptychomitrium polyphyllum* Fürnr. Worston !! The two last-named are extinct in the localities named in my former list.

Acaulon muticum C. M. Near Blackley, *B. G.*

Phascum cuspidatum Schreb. Broughton, *B. G.*

Pottia littoralis Mitt. (Southport, *Percival*).—*P. Heimii* Fürnr. Gate Wharf and Fiddler's Ferry, near Warrington, *Wilson.*

Tortula aloides De Not. Burnley, *Scholefield* (*A*).—*T. muralis* *var. *rupestris* Wils. Worston and Chatburn !! — **T. intermedia* Berk. Pendle Hill !! — *T. subulata* Hedw. Dallam, near Warrington, *Wilson.* — **T. mutica* Ldb. Mitton, Clitheroe, and Chatburn !!

Barbula tophacea Mitt. Broughton, *B. G.* (Kersal Moor and Clifton Junction, *Wild*). Cheetwood, *H.* — **B. spadicea* Mitt. Pendle Hill !!—**B. cylindrica* Schp. Chatburn !!—*B. vinealis* Brid. Hightown !!, Crossens !!, Walton !!, and Clitheroe !! — *B. rigidula* Mitt. Mr. Holt points out that Mr. Wild's Broughton record is erroneous. The specimens (which Mr. Holt has shown to me) were *B. tophacea* (Bamford, *B. G.*), *B. revoluta* Brid., Hough End Hall, and (Clifton Junction) *B. G.*

Weisia microstoma C. M. Kersal Moor, *B. G.*—*W. squarrosa* C. M. Near Parkside, *Wilson.*—*W. rupestris* C. M. Bamford, *B. G.*). Simpson's Clough Bridge, *G. F.*

Trichostomum crispulum* Bruch. Chatburn !!—T. nitidum* Schpr. Pendle Hill !!—**T. tortuosum* Dixon. Worston !!—*Var. *fragilifolium* Dixon. Chatburn !!

**Zygodon Mougeotii* B. & S. Fo Edge, *Percival.*

Orthotrichum affine Schrad. (Jackson's Boat, *B. G.*).—**O. rivulare* Turn. Sparingly about Clitheroe !!

Schistostega osmundacea Mohr. Stirrup Brook, *Martin.* Chadwick, near Bolton, *Wilson.* Clifton Junction, *Hunt.*

Splachnum ampullaceum L. Woolston Moss, *Wilson.* Near Blackley, *B. G.* Unsworth Moss, *Percival.*—*S. sphæricum* L. f. Woolston Moss, *Wilson.* Rochdale, *Belfield.* Whiteley Dean, *H.*

Tetraplodon mnioides B. & S. Woolston Moss, *Wilson* (Chat Moss, *B. G.*).

Discelium nudum Brid. Mr. Cash thinks that Caley's original record refers to the Boggart Hole Clough locality. There are specimens from Caley in the British Museum, dated "Manchester, 1795." Bamford, and between Radcliffe and Pilkington, *B. G.* Patricroft, Prestwich, and Blackburn, *Hunt.*

Ephemerum serratum Hpe. Wilgrave and Dallam, *Wilson*.

Physcomitrium pyriforme Brid. Old Trafford, Sailors-shore, and Clifton, *Hunt*. Cheetham Hill, *Wild*.—*Funaria Templetoni* Sm. Prestwich, *Horsefield*.

Aulacomnion androgynum Schwgr. Barton and Hough End Hall, *B. G.*

Catoscopium nigritum Brid. Freshfield, *P. G. Cunliffe*. Birkdale, *Cash*

Breutelia arcuata Schpr. Near Manchester, *Bradbury* in Turner's Bot. Guide, 1805.

Leptobryum pyriforme Wils. Worsley, Whalley, and Clifton Junction, *H.* Rusholme, *Cash*.

Webera elongata Schwgr. (Shawforth, *Horsefield*).—*W. annotina* Schwgr. Winwick and Padgate, *Wilson*. (Clifton and Bamford, *H.*). Kirby !!, Rainford !!—*Var. *angustifolia* Schpr. Sandstone quarry near Kirby !!—*W. commutata* Schpr. Pendle Hill !!

**Bryum filiforme* Dicks. Clifton Viaduct, *B. G.*—*B. inclinatum* Bland. Chatburn !!—*B. pallens* Swartz. (Boggart Hole Clough and Sailors-shore, *B. G.*). Old Trafford, *Hunt*. — *B. turbinatum* Schwgr. (Broughton, *Dr. Wood*. Clifton, *Makin*). — *B. bimum* Schreb. (Clifton Junction, *H.*). — *B. pseudo-triquetrum* Schwgr. Netherton !!, Walton, and Hightown !!—*B. neodamense* Itzig. Fruiting specimens were first found in Britain at Southport by Messrs. Percival and Rogers, June, 1875 (*Holt*). In the British Museum Herbarium there are specimens in young fruit collected at Ainsdale in September, 1860. — *B. intermedium* Brid. Cheetwood, *H.* — *B. Donianum* Grev. (Winwick, *Wilson*).—*B. erythrocarpon* Schwgr. Newton, Warrington, *Wilson*.—*B. roseum* Schreb. Blackley, *Hobson*, in a letter to Wilson, 1839. (*Cash*).

Mnium affine var. *elatum* B. & S. Southport, *Percival & Rogers*. Netherton !!—*M. punctatum* L. Ince Blundell and Clitheroe.—*M. serratum* Schrad. (Clifton, *H.*).—*M. subglobosum* B. & S. Rooley Moor and (Reddish) *B. G.* Dean Clough, *Turner*. Clayton, *Warburton*. Rochdale and Whiteley Dean, *Belfield*.

Fontinalis antipyretica L. Extinct at Bootle and Fazackerley. Common in the Ribble district !!—*F. squamosa* L. (Blackley, *Miller*.)

Neckera crispa* Hedw. and *var. *falcata* Boul. Near Worston !! —N. complanata* Hubn. Worston !! Clitheroe !!

**Homalia trichomanoides* Brid. Clitheroe !!, *Cash*. Mitton !! Worston !!

**Pterygophyllum lucens* Brid. Mere Clough, *B. G.* Bamford, *Percival*. Near Mitton !!

**Porotrichum alopecurum* Nutt. Worston !!

Leskea polycarpa Ehrh. Dallam, *Wilson*. (Jackson's Boat, *B. G.*). Clitheroe !!—*Var. *paludosa* Hedw. Chatburn !!

Anomodon viticulosus H. & T. Worston !!

**Thuidium recognitum* Ldb. Near Chatburn !!

Climacium dendroides W. & M. Broughton and Chorlton, *B. G.*

Heterocladium heteropterum B. & S. Rowley Moor, *B. G.* Jumbles, *Percival & Rogers*.

Camptothecium lutescens B. & S. Southport, *Holt*. Hightown !! *Brachythecium Mildeanum* Schpr. Crossens !! — *B. populeum* B. & S. (Bamford, *B. G.*). Clitheroe !! — *B. rutabulum* *var. *longisetum* Schpr. Walton !!—*Var. *robustum* B. & S. Walton and Ince Blundell !! — *Var. *plumulosum* B. & S. Hightown !! — *B. rivulare* B. & S. Ashworth and Bamford Wood, *B. G.* Mitton !! Chatburn !! and Clitheroe !!—*B. plumosum* B. & S. Walton !! Mitton !! Chatburn !! and Clitheroe !! — *B. cæspitosum* Dixon. Dallam and Longford, *Wilson*. Now lost in both localities owing to chemical refuse in the streams, *Cash*.

***Hyocomium flagellare* B. & S. Rowley Moor, *B. G.* Jumbles, *Percival & Rogers*. Bamford and Whiteley Dean, *H.* Clitheroe and Worston !!

Eurhynchium piliferum B. & S. Worston !! — *E. crassinervium* B. & S. Mitton !! Clitheroe !! — *E. Swartzii* Hobk. (Winwick, *Wilson*). — *E. pumilum* Schpr. Winwick, *Wilson*. — **E. murale* Milde and *var. *julaceum* Schpr. Chatburn !!—*E. striatum* B. & S. Abundant in the Ribble district !!—*E. rusciforme* Milde. Clitheroe and Pendle Hill !!

Plagiothecium denticulatum *var. *majus* Boul. Warbreck Moor, Walton !! This may have been the "*P. sylvaticum*" recorded from this locality by *Marrat*. Rainford !! Netherton !! — *P. sylvaticum* B. & S. Mitton !! Clitheroe !! — *Var. *succulentum* Wils. Winwick, *Wilson*.—*P. Borrerianum* Spr. (Bamford, *H.*). Pendle Hill !!

Amblystegium radicale P. Beauv. Paddington, *Wilson*. In view of recent views regarding this plant, modern confirmation is required. — *A. filicinum* De Not. Hightown !! Burscough Junction !!—Var. *elatum* Schpr. Southport, *Holt*.

A. filicinum var. WHITEHEADII mihi. Dull greenish yellow. Stems tall and slender, erect cæspitose, or floating; more gracile than the type; very slightly, usually scarcely at all pinnate, but rather irregularly branched, many stems being almost simple. When branched the pinnæ diverge at a more acute angle than in the type. Paraphylla few, and the conspicuous reddish tomentum of the type almost absent. Leaves narrower, more distant, less strongly acuminate, and not at all secund or falcate, but straight and erect patent even to the extremities of the branches. There is some doubt as to whether this is identical with the *forma prolixa* De Not. Mr. Dixon thought it was, but Mons. Renauld seems inclined to the contrary opinion. Until it can be compared with authentic examples of the plant of De Notaris, the point must remain doubtful. But I am strongly of opinion that this plant deserves to rank as something more than a mere form, and I am supported by Mons. Renauld in according it varietal rank. He says, *in litt.*:—"J'ai trouvé en 1883 une forme analogue que j'ai nommée var. subsimplex. Lorsque Mons. Husnot publiait son 'Muscologia Gallica' je lui ai communiqué cette var. *subsimplex*, et j'ignore pourquoi il ne l'a pas fait figurer dans son ouvrage. Ce nom n'ayant pas été publié, c'est celui le var. *Whiteheadii* Wheldon qui doit être conservé." Mr. Dixon writes:—"It

is certainly a marked variety, but in such a protean moss as *A. filicinum* one hesitates to create varieties; but it seems more deserving, however, than many varieties, and the name you suggest is appropriate." The more distant, erect patent leaves; the slender, slightly branched, less tomentose stems; and the peculiar dull ochraceous green colour, together impart a characteristic and untypical facies to the plant which is remarkably constant in specimens I have from widely separated localities. It grows in wet sandy ground, where liable to inundation, in South Lancashire at Southport, Birkdale, and Ainsdale, and in West Lancashire between Lytham and St. Annes. Mr. Dixon has kindly sent me specimens gathered by himself on Gullane Links, Haddington, N.B., July, 1897; and Mons. Renauld sends it from Boussens, Haute-Garonne, May, 1883.

Hypnum riparium L. Bruch, near Warrington, *Wilson*.—*H. polygamum* Schpr. (Rochdale, *H.*).—Var. *stagnatum* Wils. Burscough Junction !!—*H. stellatum* Schreb. Mitton !! Worston !!—*Var. *protensum* B. & S. Chatburn and Pendle Hill !!—*H. elodes* Spr. Hightown and Burscough Junction !!—*H. chrysophyllum* Brid. Orford, *Wilson*. Old Trafford, *Hunt*. Clitheroe !!—*H. aduncum* Hedw. (*typicum*). Southport !! Netherton !!—*Var. *tenue* Schpr. Southport, *H.* !!—*Var. *paternum* Sanio. Southport !!, *H.* Walton !! Birkdale, and Ainsdale.—*Var. *intermedium* Schpr. Southport !!, *H.* Ince Blundell !! Burscough Junction !!—**H. Sendtneri* Schpr. Southport !!, *Wilson* (*Braithwaite*), where it still abounds; also at Burscough, Ainsdale, Birkdale, and Netherton !!—*H. Wilsoni* *var. *hamatum* Ldb. Southport !! Ainsdale !!—*H. fluitans* L. Woolston Moss, *Wilson*. Rooley and Kersal Moors, *Percival*.—*Var. *falcatum* Schpr. Pendle Hill !!—*H. exannulatum* Gumb. Pendle Hill.—Var. *Kotæ* De Not. Southport, in plenty !!—*Forma *falcifolium* Ren. Southport !!—*Var. *purpurascens* Schpr. Blackston Edge, *H.* !!—*H. intermedium* Lind. Southport and Whiteley Dean, *H.* !!—*Var. *falcatum* Sanio. Southport, *H.* !!—*H. uncinatum* Hedw. Pendle Hill !!—*H. commutatum* Hedw. Kersal Moor, *Percival*. Newton Heath, *Lees*. Common in Ribble district !!—*H. falcatum* Brid. Burnley, *Scholefield* (A).—*H. cupressiforme* var. *resupinatum* Schr. Clitheroe !! Worston !!—(*H. crista-castrensis* L. This, Mr. Holt tells me, is generally regarded as an error by local botanists, and it should be excluded.)—*H. Patientiæ* Ldb. Newton and Warrington, *Wilson*. Hale, *Marrat*.—*H. palustre* L. (Bamford and Rochdale, *H.*).—*Var. *subsphæricarpon* B. & S. Rill on Pendle Hill !! Chatburn !!—*H. ochraceum* Turn. Whiteley Dean, *H.*—*H. cordifolium* Hedw. With fruit at Netherton and Rainford !!

Hylocomium triquetrum B. & S. Fruiting in Botany Bay Wood, near Whalley, *Hunt*. Common in Ribble district !! as are also *H. splendens* B. & S. !! and *H. squarrosum* B. & S. !! The latter in fruit, Chat Moss, *H.*, and Clitheroe !!—**H. brevirostre* B. & S. Clitheroe and Worston !!

RADNORSHIRE AND BRECONSHIRE PLANTS.

By the Rev. W. Moyle Rogers, F.L.S.

Having spent the latter half of last July and the whole of August on the borders of the counties of Radnor and Brecon, I have thought that some account of the plants I saw in my botanical rambles may be not altogether without interest to others. Twice, for two or three days at a time, I had the great advantage of the Rev. Augustin Ley's companionship. My son, F. A. Rogers, was also with me for the first fortnight. To their more extended exploration I am indebted for several interesting records, as they examined ground which I could not reach; while Mr. Ley's guidance and advice as to the best localities was invaluable. Omitting for the present all mention of the Rubi, I give a complete list of the other plants seen. When the species are really common ones and have been already recorded for the two counties, the specific name alone will be given, *without localities*. When the comital number (42 for Brecon, or 43 for Radnor) is added in brackets, it must be understood that I have seen the plant, not (as in the case of those to which no comital number is attached) in both counties, but only in the one county represented by the number. An asterisk will be prefixed in those cases where I believe (Mr. Arthur Bennett assenting) that there has been no previous record for the county.

The districts examined were (to describe them very briefly) the neighbourhood of Presteign, at the S.E. corner of Radnorshire; the Wye Valley for some twenty-five miles, from Rhayader in the N.W. to Hay in the S.E., with part of the Yrfon Valley near Builth, together with portions of the Llangorse and Talgarth neighbourhoods, further south in Breconshire. The exceptional heat did much to curtail my expeditions, and I reached only a very moderate height on the hills; but I botanized pretty steadily from day to day for six weeks, and so was able to explore with some thoroughness a fair amount of interesting ground in the two counties, though seldom going far from the actual Wye Valley.

The following list will show that I altogether failed to find many of our common S. England plants, including *Eupatorium cannabinum*, *Gentiana Amarella*, *Erica Tetralix* and *E. cinerea*, *Myosotis repens*, *Veronica Anagallis* and *V. scutellata*, *Lycopus europæus*, *Thymus Chamædrys*, *Solanum nigrum*, *Plantago Coronopus*, *Euphorbia amygdaloides*, and *Molinia varia*. I was also much struck with the extreme rarity of (among others) *Papaver Rhœas*, *Lythrum Salicaria*, *Galium Mollugo*, *Solanum Dulcamara*, *Ballota nigra*, *Lamium album*, and *Scleranthus annuus*. Moreover, the long drought had quite dried up an unusually large number of early-flowering species.

Anemone nemorosa L. (42). — *Ranunculus circinatus* Sibth. 42. Llangorse Lake, *F. A. Rogers*!—*R. hederaceus* L.—*R. Flammula* L.—*R. acris* L.—*R. repens* L.—*R. bulbosus* L.—*R. Ficaria* L. (42).—*Caltha palustris* L.

Castalia speciosa Salisb. 42. Llangorse Lake, *F. A. Rogers*!

Papaver **Rhœas* L. Seen only at Presteign in Radnorshire, and not at all in Breconshire. — *P. dubium* L. a. *Lamottei* (Bor.). 42. About Builth, in several places; near Three Cocks Junction. *43. Presteign.—*Meconopsis cambrica* Vig. 42. Duhonw Glen, near Builth.—*Chelidonium majus* L.

Fumaria Boræi Jord. 42. Near Three Cocks Hotel.—*F. confusa* Jord. 42. Hay Hill. 43. Presteign.—*F. officinalis* L. (43).

Nasturtium officinale R. Br.—*N. sylvestre* R. Br. 42. By R. Wye at Hay. *43. Opposite Hay. — *Barbarea vulgaris* R. Br. — *Cardamine pratensis* L. — *C. hirsuta* L. (42). — *C. flexuosa* With. — *C. impatiens* L. 43. Aberedw.—*Erophila vulgaris* DC. 43. Presteign.—*Sisymbrium Thalianum* J. Gay. 43. Builth Road. — *S. officinale* Scop.—*S. Alliaria* Scop.—*Brassica Rapa* L. c. *Briggsii* H. C. Wats. 42. Builth and Yrfon Valley, in good quantity. — *B. Sinapistrum* Boiss.—*B. alba* Boiss. 42. Builth. — *Bursa Bursa-pastoris* Weber. —*Coronopus didymus* Sm. 42. Hay, in plenty. — *Lepidium hirtum* Sm. Frequent. 42. Yrfon Valley; Newbridge-on-Wye. 43. Builth Road; Stanner Rocks. — *Teesdalia nudicaulis* R. Br. Stanner Rocks, *F. A. Rogers*!

Reseda Luteola L. 42. Hay; near Three Cocks Junction. 43. Near Hay; Boughrood.

Helianthemum Chamæcistus Mill. 43. Stanner Rocks.

Viola odorata L. 42. Near Builth; near Three Cocks Hotel.—*V. Riviniana* Reich. — *R. tricolor* L. 42. Builth, garden weed.—*R. arvensis* Murr.

Polygala oxyptera Reichb. 42. Furzy slope between Maesmynis and Builth.—*P. serpyllacea* Weihe.

Silene Cucubalus Wibel. — *Lychnis alba* Mill. — *L. dioica* L.—*L. Flos-cuculi* L.—*Cerastium quaternellum* Fenzl. 43. Hillside (near the top) above Llanelwedd.—*C. glomeratum* Thuill.—*C. triviale* Link. —*Stellaria aquatica* Scop. 42. Streamside near Three Cocks Hotel. —*S. media* Cyr.—*S. Holostea* L.—*S. graminea* L.—*S. uliginosa* Murr. —*Arenaria trinervia* L.—*A. serpyllifolia* L.—*Sagina apetala* L. 42. Hay; near Three Cocks Junction. *43. Presteign; Erwood; Boughrood. — *S. ciliata* Fr. *43. Llowes; Llanelwedd. — *S. procumbens* L.—*Spergula arvensis* L.

Hypericum perforatum L. Fairly common, but much less so than the next species. — *H. dubium* Leers. Common everywhere, and usually most abundant.—*H. quadratum* Stokes.—*H. humifusum* L. 42. Yrfon Valley. 43. Frequent.—*H. pulchrum* L.—*H. hirsutum* L. 42. Hay Hill; Three Cocks; near Talgarth. *43. Presteign neighbourhood; Stanner Rocks; Rhayader. — *H. montanum* L. *43. Stanner Rocks and neighbourhood.

Malva moschata L. Remarkably common in both counties.—*M. sylvestris* L.—*M. rotundifolia* L. 42. Apparently scarce. Hay; near Three Cocks Hotel, in one spot. *43. Sillia, Presteign; Llowes; Glasbury.

Linum catharticum L.

Geranium pratense L. 42. Near Three Cocks Junction. 43. Near Builth; Llowes. — *G. molle* L. — *G. dissectum* L.—*G. colum-*

binum L. Rare. 42. By railroad near Three Cocks Junction, one plant. 43. Stanner Rocks. — *G. Robertianum* L. — *Erodium cicutarium* L'Hérit. Seen only at Stanner Rocks, *43. — *Oxalis Acetosella* L.

Ilex Aquifolium L. — *Euonymus europæus* L. Seen only in the Talgarth and Glasbury Road, 42, where it is locally frequent, especially at the Talgarth end.

Acer pseudo-platanus L. Frequently planted. — *A. campestre* L. Very common.

Genista tinctoria L. Local. 42. By R. Wye at Builth; near Llangorse. 43. Near Builth Road, abundant; Llanelwedd.— *Ulex europæus* L. — *U. Gallii* Planch. Very common. — *Ononis repens* L. a. *inermis* Lange. 42. Brecon Road, Builth. — b. *horrida* Lange. 42. The Warren, Hay.—*Medicago lupulina* L. 42. Common. *43. Aberedw.—*Trifolium pratense* L.—*T. medium* L. 42. Hay Hill, abundant; near Builth; Yrfon Valley; Llangorse. 43. Stanner Rocks.—*T. arvense* L. 43. Sillia, Presteign.—*T. striatum* L. *43. Sillia, Presteign. — *T. hybridum* L. A frequent colonist in both counties. — *T. repens* L.—*T. procumbens* L. — *T. dubium* Sibth.—*Lotus corniculatus* L.—*L. uliginosus* Schkuhr.—*Ornithopus perpusillus* L. 43. Llanelwedd. — *Vicia hirsuta* Gray (43). — *V. gemella* Crantz. 43. Boughrood. — *V. Cracca* L. — *V. Orobus* DC. 43. Rhayader, *Ley*!—*V. sepium* L.—*Lathyrus pratensis* L.—*L. montanus* Bernh. 42. Builth; wood-border between Builth and Maesmynis. 43. Llanelwedd, abundant.

Prunus spinosa L. — *P. Avium* L. — *P. Cerasus* L. 42. Near Builth. — *Spiræa Ulmaria* L. — *Geum urbanum* L. — *G. rivale* L. 42. Near Builth, abundant.—*Fragaria vesca* L.—*Potentilla Fragariastrum* Ehrh.— *P. silvestris* Neck.— *P. reptans* L.— *P. Anserina* L. —*Alchemilla arvensis* Scop. 43. Erwood and Llanelwedd, in great quantity. — *A. vulgaris* L. — *Agrimonia Eupatoria* L. — *A. odorata* Mill. Apparently rare. *42. Yrfon Valley, *Ley*! Also found by Mr. Ley in the Honddu Valley in 1897. — *Poterium officinale* Hook. fil. 42. Builth neighbourhood, common. 43. Builth Road; Rhayader. — *Rosa mollis* Sm. I saw no bush that I could thus name with certainty, but Mr. Ley and I were agreed in thinking that a small form growing on a steep furzy slope on the Brecon Road near Builth, 42, looked like a weak state of this species.— *R. tomentosa* Sm. Common. — *R. micrantha* Sm. Seen only by R. Wye, near Builth, 42. — *R. obtusifolia* Desv. The typical plant frequent. — b. *frondosa* Baker. 43. Near Builth. Just the plant that Mr. J. G. Baker has often so named for me. — c. *tomentella* (Leman). Typical. 42. Yrfon Valley, near Builth.—*R. canina* L. Very common.—a. *lutetiana* (Leman). Distinctly the most frequent form. — e. *dumalis* (Bechst.). Fairly common. — Forma *verticillacantha* (Mérat). 43. Sillia, Presteign.—Forma *aspernata* (Déségl.). 42. Between Talgarth and Three Cocks Junction.—i. *urbica* (Leman), 42. Hay Hill; near Builth; Altmawr; Three Cocks. 43. By R. Wye, opposite Hay.—Forma *Kosinciana* Baker. 42. By R. Wye near Builth. — Forma *platyphylla* Rau. 42. Frequent near Builth and Three Cocks Hotel.—j. *dumetorum* (Thuill.). 42. Near Builth.

—k. *arvatica* Baker (non Puget). 43. Near Presteign; near Builth. — *R. glauca* Vill. 43. By R. Wye, near Builth, fairly or quite typical in one place. Elsewhere in both counties forms more or less intermediate between *R. canina* and *R. glauca* are frequent, some of which, and perhaps most of them, might be divided between *R. subcanina* Christ and *R. subcollina* Christ. — *R. arvensis* Huds. Common.—*Pyrus Aucuparia* Ehrh.—*P. communis* L. By R. Wye near Builth, 42; and near Builth Road Junction, 43. Probably not indigenous in either place.—*P. Malus* L. b. *mitis* Wallr. Frequent.—*Cratægus Oxyacantha* L. d. *monogyna* (Jacq.).

Chrysosplenium oppositifolium L. 43. Rhayader.—*Ribes Grossularia* L. and *R. rubrum* L. Fairly frequent in 42, but not, I think, certainly indigenous. — *R. alpinum* L. 42. Well established by R. Wye near Hay, but probably enough planted there originally.

Cotyledon Umbilicus L. 42. Here and there in some quantity between Talgarth and Glasbury. 43. Stanner Rocks; Llowes; Rhayader. — *Sedum Telephium* L. a. *purpureum* L. 43. Clearly indigenous. Aberedw Rocks; near Builth Road. — *S. anglicum* Huds. Common on rocks by R. Wye and on stony hillsides near, in 42 and 43. — *S. acre* L. — *S. reflexum* L., a glaucous-leaved form. 42. Apparently indigenous in Duhonw Glen. Rather frequently planted on walls. — *S. Forsterianum* Sm. 43. Stanner Rocks, in great quantity.

Myriophyllum spicatum L. 42. Llangorse Lake, *F. A. Rogers*! —*Callitriche stagnalis* Scop. (42).

Peplis Portula L. Apparently rare. 43, Near Builth Road.—*Lythrum Salicaria* L. Seen only near Llangorse Lake, 42.

Epilobium angustifolium L. 42. By Llangorse Common. 43. Boughrood.—*E. hirsutum* L. Frequent in 42, but less so in 43.—*E. parviflorum* Schreb. Very common in 42 and *43. — *E. montanum* L. — *E. roseum* Schreb. 42. Stream, Hay; stream near Three Cocks Hotel. In plenty in both localities. — *E. obscurum* Schreb. — *Circæa lutetiana* L. — *C. alpina* L. 42. Yrfon Valley, *Ley*!

Bryonia dioica Jacq. Uncommon. 42. Hay; Three Cocks. 43. Llowes; Boughrood.

Hydrocotyle vulgaris L. Only seen near Builth Road Junction, 43.—*Sanicula europæa* L.—*Conium maculatum* L. 42. Hay; Three Cocks. 43. Common. — *Apium nodiflorum* Reichb. fil. 42. Hay; Llangorse Common. 43. Llanelwedd (c. *ocreatum* Bab.). — *Sison Amomum* L. *42. Road near Three Cocks Hotel, and again half a mile from it; locally abundant. — *Ægopodium Podagraria* L. 42. Hay; Builth. 43. Newbridge; Boughrood.—*Pimpinella Saxifraga* L. One of the two or three commonest umbellifers. — *Conopodium denudatum* Koch (42). — *Chærophyllum temulum* L. — *Anthriscus sylvestris* Hoffm. — *Œnanthe crocata* L. — *Æthusa Cynapium* L.—*Silaus flavescens* Bernh. 42. By Tal-y-llyn Junction and in field near.—*Angelica sylvestris* L.—*Heracleum Sphondylium* L. Also the var. *angustifolium* Huds. 42. Near Three Cocks Junction; Builth, Hay Road.—*Daucus Carota* L. (43).—*Caucalis Anthriscus* Huds.

Hedera Helix L.—*Cornus sanguinea* L. Remarkably common.

Sambucus nigra L.—*S. Ebulus* L. 42. R. Wye bank, abundant. —*Virburnum Opulus* L —*Lonicera Periclymenum* L.

Galium Cruciata Scop.—*G. verum* L.—*G. Mollugo* L. Singularly rare. Seen only near Presteign, 43.—*G. saxatile* L.—*G. palustre* L. Common, and usually, if not exclusively, the var. *Witheringii* (Sm.). —*G. Aparine* L.—*Asperula odorata* L. 42. Duhonw Glen; Yrfon Valley.—*Sherardia arvensis* L. (43).

Valeriana Mikanii Syme. 43. Sillia, Presteign.—*V. sambucifolia* Willd.—*Valerianella dentata* Poll. 42. Hay Road, Builth.

Dipsacus sylvestris Huds. Seen only at Presteign, 43; and in a garden near Three Cocks Hotel, 42. — *D. pilosus* L. 43. Llowes, *F. A. Rogers*!—*Scabiosa succisa* L.—*S. arvensis* L. Decidedly local. 42. Near Builth; between Talgarth and Three Cocks Junction. 43. Aberedw; Boughrood.

Solidago Virgaurea L.—*Bellis perennis* L.—*Filago germanica* L. Rare. 42. Duhonw Glen. 43. Stanner Rocks. — *F. minima* Fr. 42. Llanelwedd; Erwood, in great quantity. — *Gnaphalium uliginosum* L. — *G. sylvaticum* L. 43. Newbridge-on-Wye. — *Inula Conyza* DC. *43. Stanner Rocks. — *Pulicaria dysenterica* Gaertn. Decidedly local. 42. By Tal-y-llyn Junction; Llangorse Common, abundant; Talgarth and Three Cocks Road, frequent. *43. Builth Road. — *Achillea Millefolium* L. — *A. Ptarmica* L. Uncommon. 42. Near Builth. 43. Llanelwedd; Builth Road, abundant. — *Chrysanthemum Leucanthemum* L. — *C. Parthenium* Pers. — *Matricaria inodora* L. — *M. Chamomilla* L. Rare. 42. Hay; Talgarth and Three Cocks Road, a few plants. *43. Clyro, between Hay and Llowes. *Tanacetum vulgare* L.—*Artemisia Absinthium* L. Only in more or less waste spots near gardens and farmyards. 42. Near Builth. 43. Erwood; Boughrood; Clyro. *A. vulgaris* L.—*Tussilago Farfara* L.—*Petasites officinalis* Mœnch.—*Senecio vulgaris* L. — *S. sylvaticus* L. Rare. 43. Rhayader.—*S. Jacobæa* L. — *S. aquaticus* Huds. — *Carlina vulgaris* L. Local. 42. By R. Wye, near Builth. 43. Stanner Rocks; Llanelwedd; Erwood. — *Arctium majus* Bernh. Seen only at Clyro, 43. — *A. nemorosum* Lej. Common in *42 (Builth, Newbridge, &c.) and *43 (Aberedw, Llowes, &c.), though not always quite characteristic. —*A. minus* Bernh. — *Carduus nutans* L. Seen only by roadside about a mile from Builth on the Swansea Road, ten to twelve plants near together, nearly opposite a farmhouse. — *C. crispus* L. 42. Common. *43. Near Hay; Llowes; Builth; Boughrood; Presteign.—*Cnicus lanceolatus* Willd.—*C. palustris* Willd.—*C. arvensis* Hoffm. — *Serratula tinctoria* L. Uncommon. 42. Near Builth. 43. Llanelwedd. — *Centaurea nigra* L. — *Lapsana communis* L.—*Picris hieracioides* L. *42. Frequent between Talgarth and Glasbury. 43. Llowes. — *Crepis virens* L. — *Hieracium Pilosella* L.—*H. sciaphilum* Uechtritz. Frequent. 42. Hay Hill; Builth neighbourhood. 43. Sillia, Presteign; Rhayader. This hawkweed and the next were pointed out to me by Mr. Ley. — *H. rigidum* Hartm. g. *tridentatum* (Fr.). 42. Brecon Road, Builth; Yrfon Valley.—*H. boreale* Fr. — *H. umbellatum* L. 42. Roadside bank between Talgarth and Three Cocks Junction. 43. Rhayader.— *Hypochæris*

radicata L. — *Leontodon hirtus* L. Locally abundant. 42. By R. Wye near Builth. *43. Builth Road; Erwood.—*L. hispidus* L. Common. One plant of the form with glabrous involucre (*L. hastilis* L.) occurred on the Hay Road near Builth, 42.—*L. autumnalis* L.—*Taraxacum officinale* Web.—*Lactuca muralis* Fresen.—*Sonchus oleraceus* L.—*S. asper* Hoffm.—*S. arvensis* L.—*Tragopogon pratense* L. Fairly frequent. 42. Newbridge. 43. Presteign; Builth Road; Aberedw.

Jasione montana L. 42. Brecon Road, Builth. 43. Presteign Rhayader.—*Wahlenbergia hederacea* Reichb. Seen only by R. Wye, above Builth, 42. — *Campanula Trachelium L.* 43. Presteign.—*C. latifolia* L. 42. Roadside about half-way between Talgarth and Three Cocks Junction. 43. Near Llowes; Wye banks at Boughrood.—*C. rotundifolia* L.—*C. patula* L. 43. Bushy banks by roadside between Stanner Rocks and Presteign; near Llowes.

Vaccinium Myrtillus L. 42. Wood between Maesmynis and Builth. 43. Presteign.—*Calluna Erica* DC. No true heath seen.

Primula acaulis L. — *Lysimachia vulgaris* L. 42. Near Builth, *Ley*!; by Llangorse Lake, *F. A. Rogers*! — *L. Nummularia* L. 42. Brecon Road, Builth; Duhonw Glen. 43. Boughrood, by R. Wye. —*L. nemorum* L.—*Anagallis arvensis* L. Rather uncommon.

Fraxinus excelsior L.—*Erythræa Centaurium* Pers. 42. Frequent. *43. Builth Road; Llowes.—*Menyanthes trifoliata* L. Seen only in boggy meadow near Duhonw Glen, 42.

Symphytum officinale L. Uncommon or rare. 42. Near Builth; near Three Cocks Junction. 43. Near Clyro. — *Myosotis cæspitosa* F. Schultz. Very common.—*M. palustris* Relh. 42. Abundant on Llangorse Common and by the streams near Three Cocks Junction. 43. Presteign.—*M. arvensis* L.

Volvulus sepium Junger. Common in 42 and *43 (Builth Road, Erwood, &c.).—*Convolvulus arvensis* L. Seen only at Llowes, *43.

Solanum Dulcamara L. Uncommon. 42. Llangorse Common. 43. Builth Road; Llowes.—*Lycium barbarum* L. 42. Established as an escape, two or three bushes, in corner of field opposite Three Cocks Hotel.

Verbascum Thapsus L. 42. Seen only near Three Cocks Hotel. *43. Frequent and locally abundant. Sillia, Presteign; Llanelwedd; Aberedw Rocks; Erwood; Boughrood; Llowes. — *Linaria Cymbalaria* Mill. Seen only on walls at Presteign, 43.—*L. vulgaris* Mill.—*L. viscida* Moench. Seen only on railroads, but there often abundant. 42. Tal-y-llyn Junction. 43. Near Builth Road; Boughrood. — *Scrophularia aquatica* L. 42. Hay; Three Cocks; Talgarth. 43. Llowes. All the plants examined by me belonged to the form b. *cinerea* Dum. — *S. nodosa* L. — *Digitalis purpurea* L. —*Veronica polita* Fr. 42. Common. *43. Boughrood, &c. — *V. agrestis* L.—*V. Tournefortii* C. Gmel. 42. Common. *43. Llanelwedd; Boughrood.—*V. arvensis* L.—*V. serpyllifolia* L.—*V. hybrida* L. 43. Stanner Rocks, *F. A. Rogers*!—*V. officinalis* L.—*V. Chamædrys* L.—*V. montana* L. Seen only near Maesmynis, 42.—*V. Beccabunga* L. — *Euphrasia officinalis* L. — *Bartsia Odontites* Huds.—*Pedicularis sylvatica* L. Apparently far from common. By R. Wye

in the Builth neighbourhood, 42 and 43. — *Rhinanthus Crista-galli* L. — *Melampyrum pratense* L. 42. Near Builth. 43. Rhayader. — e. *hians* Druce. 42. Yrfon Valley, near Builth; near Maesmynis.

Verbena officinalis L. Seen only near Three Cocks Hotel, 42.

Mentha longifolia Huds. 42. Streamsides near Three Cocks Hotel, in considerable quantity. — *M. hirsuta* Huds. — *M. sativa* L. (43). — *M. rubra* Sm. 43. Hillside stream, Erwood. — *M. arvensis* L. — *Origanum vulgare* L. Uncommon. 42. The Warren, Hay. 43. Near Builth Road; Llowes; Stanner Rocks. — *Thymus Serpyllum* Fr. Fairly frequent. — No *T. Chamædrys* Fr. seen. — *Calamintha Clinopodium* Spenn. Very common in 42 and *43 (Presteign, Hay, Builth, &c.).—*Nepeta Glechoma* Benth.—*Prunella vulgaris* L. —*Stachys Betonica* Benth. Very common.—*S. palustris* L. Common. — × *sylvatica* (*ambigua* Sm.). 43. Builth Road; Newbridge. —*S. sylvatica* L. — *S. arvensis* L. (42). — *Galeopsis Tetrahit* L. 42. Frequent.—*Lamium purpureum* L.—*L. album* L. Uncommon. 42. Near Duhonw Glen; in one spot near Three Cocks Hotel. 43. Presteign; Rhayader.—*L. Galeobdolon* Crantz. 42. Glen between Maesmynis and Builth. Apparently rare.—*Ballota nigra* L. Seen only near Three Cocks Hotel, 42; though there fairly abundant (a. *fœtida* Koch). — *Teucrium Scorodonia* L. — *Ajuga reptans* L. Seen only in the glen between Maesmynis and Builth, 42.

Plantago major L. Type and b. *intermedia* (Gilib.).—*P. lanceolata* L.

Scleranthus annuus L. Seen only near the base of the hill above Llanelwedd Church, *43.—*S. perennis* L. 43. Stanner Rocks. Still in good quantity.

Chenopodium album L.—*C. Bonus-Henricus* L. Locally abundant near farms and villages. — *Atriplex patula* L. 42. Near Builth. 43. Near Presteign.—c. *angustifolia* (Sm.). Common.—*A. hastata* L. 42. Builth; Hay.

Polygonum Convolvulus L.—*P. aviculare* L.—*P. Hydropiper* L. — *P. Persicaria* L. — *P. lapathifolium* L. 42. Hay. 43. Boughrood.—*P. amphibium* L. 42. Llangorse Lake, *F. A. Rogers*! *43. (b. *terrestre* Leers) Llanelwedd. — *Rumex conglomeratus* Murr. — *R. sanguineus* L., b. *viridis* (Sibth.). 43. Llanelwedd.—*R. obtusifolius* L. — *R. crispus* L. Common. — × *obtusifolius* (*acutus* L.). 42. Maesmynis.—*R. Acetosa* L.—*R. Acetosella* L.

Euphorbia Helioscopia L. (42).—*E. Peplus* L. Common, 42 and *43 (Builth; Newbridge).—*E. exigua* L. 42 and *43 (Boughrood). —*Mercurialis perennis* L.

Ulmus montana Stokes.—*Humulus Lupulus* L. Doubtfully indigenous at best. 42. Three Cocks; Talgarth. *43. Near Presteign; Llowes.—*Urtica dioica* L.—*U. urens* L. (42).

Betula verrucosa Ehrh. 42. Builth. *43. Aberedw. — *B. pubescens* Ehr. 42. Builth.—*Alnus glutinosa* Medic.—*Corylus Avellana* L.—*Quercus Robur* L.—*Fagus sylvatica* L.

Salix fragilis L. (42).—*S. cinerea* L.—*S. aurita* L.—*S. Caprea* L.—*S. repens* L. Seen only in Duhonw Glen, 42.—*S. viminalis* L. *42. Near Builth. 43. Presteign. — *Populus alba* L. 42. Near

Builth. 43. Builth Road.—*P. tremula* L. *42. Near Hay; between Talgarth and Three Cocks.

Orchis latifolia L. 42. Yrfon Valley, *Ley*!; Newbridge. — *O. maculata* L.

Tamus communis L.—*Ruscus aculeatus* L. 43. Planted. Sillia, Presteign.—*Allium vineale* L.—*A. Schænoprasum* L. 43. On rocks in R. Wye, between Builth and Builth Road Junction.

Juncus bufonius L. — *J. glaucus* Leers. 42. By Brecon Road, Builth; Three Cocks Junction. — *J. conglomeratus* L. — *J. lamprocarpus* Ehrh. — *J. acutiflorus* Ehrh. — *Luzula vernalis* DC. 43. Corton Wood, Presteign.—*L. maxima* DC.—*L. campestris* DC. (43). —*L. erecta* Desv., a. *umbellata*. 43. Corton Wood. — b. *congesta*. 42. Glen between Maesmynis and Builth. 43. Corton Wood.— —d. *pallescens* Besser. *42. In the same glen as the last, sparingly. 43. Pointed out to me by Mr. Ley in good quantity in Corton Wood (see Journ. Bot. 1896, 368).

Typha latifolia L. — *Sparganium neglectum ?* Beeby. 42. Llangorse Common. The plants were too young for certain determination.—*Arum maculatum* L.—*Lemna minor* L. (42).

Triglochin palustre L. 42. Boggy meadow, Builth. — *Potamogeton lucens* L. 42. Llangorse Lake, *F. A. Rogers*!—*P. perfoliatus* L. and *P. crispus* L. 42. With the last.

Scirpus setaceus L. 43. Rhayader. — *Carex muricata* L. — *C. divulsa* Good. *43. Llowes. — *C. echinata* Murr. — *C. remota* L. 42. Duhonw Glen; near Hay.—*C. ovalis* Good. 42. Brecon Road, Builth. — *C. acuta* L. 42. Duhonw Glen, small form. — *C. flacca* Schreb. — *C. pallescens* L. 42. Yrfon Valley, Builth. *43. Rocks in R. Wye, near Builth Road. — *C. panicea* L. (43). — *C. sylvatica* Huds. 42. Duhonw Glen.—*C. flava* L., c. *Oederi* Retz.—*C. hirta* L. (43).

Phalaris arundinacea L. (42). — *Anthoxanthum odoratum* L.— *Alopecurus geniculatus* L. Common, and all, I think, the b. *pronus* Mitt. — *A. pratensis* L. (43). — *Milium effusum* L. Seen only by R. Wye near Hay, 43.—*Phleum pratense* L. Type and b. *nodosum* (L.). — *Agrostis canina* L. 42. Near Builth, abundant. 43. Rhayader. — *A. palustris* Huds. — *A. vulgaris* With. Type and b. *pumila* (L.).—*Aira caryophyllea* L.—*A. præcox* L.—*Deschampsia cæspitosa* Beauv.—*D. flexuosa* Trin.—*Holcus mollis* L.—*H. lanatus* L. — *Trisetum pratense* Pers. — *Arrhenatherum avenaceum* Beauv.— *Sieglingia decumbens* Bernh.—*Cynosurus cristatus* L.—*Melica uniflora* Retz. (42).—*Dactylis glomerata* L.—*Poa annua* L.—*P. nemoralis* L. —*P. compressa* L. *42. Builth. 43. Presteign.—*P. pratensis* L.— *P. trivialis* L.—*Glyceria fluitans* R. Br.—*G. plicata* Fr. Type and b. *pedicellata* (Townsend).—*Festuca Myuros* L. 42. Hay, abundant; near Three Cocks Hotel. *43. Presteign. — *F. sciuroides* Roth.— *F. ovina* L. — *F. rubra* L. 42. Builth. *43. Presteign; Llanelwedd. — *F. elatior* L. — *Bromus giganteus* L. — *B. ramosus* Huds.— *B. sterilis* L.—*B. mollis* L.—*Brachypodium gracile* Beauv.—*Lolium perenne* L. — *Agropyron caninum* Beauv. 42. Builth; Llangorse Common. *43. Presteign; Llanelwedd. — *A. repens* Beauv.— *Nardus stricta* L. 43. Hill-top above Llanelwedd.—*Pteris aquilina*

L. — *Lomaria Spicant* Desv. Observed only near Presteign, 43.— *Asplenium Trichomanes* L. — *A. Ruta-Muraria* L. — *Athyrium Filix-fœmina* Roth.—*Polystichum lobatum* Presl, b. *aculeatum* Syme. 42. Hay Hill; Yrfon Valley. — *P. angulare* Presl. 43. Presteign.— *Lastræa Oreopteris* Presl. 42. Yrfon Valley, near Builth, *Ley*!— *L. Filix-mas* Presl. — *L. dilatata* Presl. 43. Near Presteign.— *Polypodium vulgare* L. (42).

Equisetum arvense L.

AN ACCOUNT OF *VELEZIA*.

By Frederic N. Williams, F.L.S.

When Caspar Bauhin was forming his herbarium, he received specimens from most of the herbalists of his time. In a parcel of plants sent him by Joachim Burser, probably in the first decade of the seventeenth century, were specimens of a plant gathered by him near Florence, which he labelled "Tunica." He recommended Caspar Bauhin to compare his plant with other specimens of the group of "Tunici," which was a name first applied to Caryophyllaceous plants by Manfredus de Monte Imperiale, who herborized about 1420. These specimens are in Bauhin's herbarium at Basel, and belong to *Velezia rigida*. They were first described by him in *Prodromus Theatri Botanici*, p. 103 (1620). The description is so characteristic of Bauhin's lucidity that, as the earliest reference to a species of *Velezia*, I here transcribe it:— "Lychnis sylvestris minima exiguo flore: ex radicula oblonga, tenui, cauliculus rotundus, rufescens, geniculatus, trium quatuorve unciarum, in alas minimas brachiatus exurgit, foliolis binis exiguis, acutis, ad quemlibet geniculum et alam, et ex qualibet ala, pedicelli oblongi, angustissimi, rigidi, quibus flosculus purpurascens, ex quinque foliolis, singulis cordis formam referentibus, compositus insidet. Hæc circa Monspelium, in pede montis qui est prope Boutonet copiose reperitur, quam Centaurium minimum appellabant. Verum ante quadriennium eandem, sed palmum superantem, et Florentiæ ad agrorum margines natam, Tunicæ peculiaris nomine, a D. Bursero accepimus." The plant is next mentioned in the more classical *Pinax* (1623), under the same name, and as a fifth form of *Lychnis hirsuta*, but is not again described.

In Jean Bauhin's *Historia Plantarum Universalis*, iii. p. 352 (1651), the plant is again described, and for the first time figured from specimens collected by Cherler at Nîmes, in Languedoc. The description of these French specimens is as follows:—"Rigidula est planta, duûm triûmve unciarum altitudine, raro palmum attingit, coliculis duris, rigidis, ramosis; folia ad nodos bina ex adverso posita, semiunciâ breviora, perangusta, pilosa, è quorum alis nascûtur calyces semiunciales, bimuli, perquam graciles, æquabiles, hirti et asperi: è quorum apice flosculus prosilit, quem præ

exiguitate vix visus capit, purpureus: radix dura lignosa: collecta per Generum Cherlerum prope Nemausum juxta molendinum." In honour of Cherler the plant is here referred to as "Lychnis minima rigida Cherleri," which suggested to Linnæus the "nomen triviale."

The next reference to *Velezia rigida* is by Paolo Boccone, who figures an Italian specimen in *Museo di Piante Rare*, p. 50, t. 43 (1697), under the name of "Lychnis corniculata, minor, sive angustifolia, saxatilis," giving as its habitat "campagne sterili di Roma, vicino al Monastero di Tre Fontane." It is figured and described under the same name by Barrelier, *Pl. Gall. Hisp. Ital. obs.* p. 665, t. 1018 (1714). Buxbaum describes and figures specimens of this same species from the Caucasus in his *Plantarum minus Cognitarum*, cent. ii. p. 41, t. 47 (1728), under the name of "Knawel minus, foliis caryophylleis," collected "in montosis aridis Iberiæ." The last of the old botanists to mention the plant is F. B. de Sauvages in his *Meth. Pl. Monspel.* p. 145 (1751); and he refers to *Silene* these specimens which were collected near Montpellier: "Silene foliis subulatis cauli appressis, calycibus rigidis intermedio longioribus."

From these notes on the early history, it is clear that only one species of *Velezia* was known to botanists and the old herbalists until the beginning of the present century; though there is evidence from the comparison of descriptions and figures cited that the less common variety of *V. rigida*, described further on in this paper, in which the calyx is much longer than in the type and nearly sessile, was certainly known to some collectors. Buxbaum's figure of specimens from the Caucasus represents this less common variety, and it also agrees with Laupmann's specimens from Sudak in the Crimea, collected more recently.

The genus *Velezia* was founded by Linnæus in honour of Francesco Velez, a Spanish traveller. Linnæus says that in the dried specimens of *V. rigida* he counted five stamens, but that Loefling, who suggested the generic name, observed six in the living plant, and that therefore, in deference to him, he placed the genus among the Hexandria Digynia. This is an instance of unusual modesty on the part of Linnæus. Subsequently, however, in *Mant. Plantarum* (p. 369), he transferred the genus to Pentandria—"ad Pentandriam digyniam amandata." The genus was defined in the following terms:—

"*Calyx*. Perianthium monophyllum, filiforme, pentagonum, persistens; ore quinquedentato, acuminato, erecto, minimo.—*Corolla*. Petala 5, brevissima, emarginato-bidentata; unguibus filiformibus, longit. calycis. — *Stamina*. Filamenta 6, capillaria, vix calycis longit.; antheræ cordatæ.—*Pistillum*. Germen cylindricum, breve, receptaculo stylorum terminatum. Styli 2, filiformes, longit. staminum; stigmata simplicia.—*Pericarpium*. Capsula cylindrica, tecta, unilocularis.—*Semina* plurima, simplici serie imposita."

The genus at present includes four species, and its geographical range is co-extensive with that of *V. rigida*, the only species described in the *Species Plantarum*. This plant occurs in the countries

round the Mediterranean, and extends as far east as Turkestan and Afghanistan.

Velezia.

Linn. Sp. Plant. 332 (1753); Gen. Plant. ed. v. 155, n. 403 (1754); *Benth. & Hook.* Gen. Plant. i. 144 (1862); *Boiss.* Fl. Orient. i. 478 (1867); *Engl. & Prantl,* Natürl. Pflanzenf. iii. abtg. 1 b. 78 (1889); *Williams*, Pinks Centr. Eur. 2 (1890).

Calyx anguste tubulosus, cylindricus, sulcatus, 5-dentatus, 5- vel 15-costatus, basi nudus. Petala 5; ungue elongato plano non lamellato, laminâ parvâ bilobâ emarginatâ bidentatâ vel quadridentatâ, fauce coronatâ vel gibboso-crassatâ. Stamina 5, uniseriata. Torus haud elongatus. Gynœcium meiomerum; ovarium uniloculare; styli 2. Capsula cylindrica, lineari-teres, in dentes 4 dehiscens, oligosperma. Semina peltata, hilo faciali excentrico, in placentam filiformem imbricata, subsessilia, lævia, demum margine involuta hinc dorso convexa facie sulcata; embryo rectus, radiculâ prominente.—Herbæ annuæ, rigide dichotomæ. Folia angusta, margine scabra. Flores breviter pedicellati, in axillis solitarii vel ad apices ramulorum approximati. Petala inconspicua rosea.

Genus a *Diantho* imprimis calyce ebracteato, staminibus uniseriatis, toro haud elongato, seminis hilo excentrico, distinguendum.

1. V. rigida *Linn.* Sp. Plant. 332; *Boiss.* Fl. Orient. i. 478; *Williams*, Pinks of Centr. Eur. 3.

Iconogr. *Lamk.* Tabl. Encycl. Meth. t. 186; *Gärtn.* Fruct. Sem. Plant. Carp. i. t. 24; *Nees*, Gen. Plant. Germ. 31, f. 3; *Sibth. & Smith*, Fl. Græca, iv. 80, t. 390; *Reichb.* Ic. Fl. Germ. Helv. 5007.

Glanduloso-puberula, 10–20 centim. et ultra. Radix fusiformis vel subramosa, brevis, flexuosa. Caulis erectus rigidus teres, sæpe inde a basi subdichotome et divaricato-ramosus, sæpe rubescens, inferne glaber, superne pubescens. Folia 3–5-nervia ciliata, basilaria rosulata spathulato-linearia, caulina erecta vel erecto-patentia anguste linearia longe acutata margine involuta, sæpe falcata. Flores secus totum caulem ramosque ad nodos solitarii aut gemini, alterni, apicem versus distichi, pedicellis crassis calyce plerumque 6-plo brevioribus suffulti. Calyx anguste cylindricus, pentagonus, æqualiter 15-nervius, dentibus longis lesiniformibus erectis. Petala contigua apice acute bidentata; lamina brevis oblonga ungue exserto 3–4-plo brevior supra faucem saturatius maculata, fauce pilis paucis (5–7) erectis albis obsita. Antheræ purpureæ ovales; polline albo. Ovarium elliptico-cylindricum, translucens. Capsula inclusa, calyce paullo brevior. Semina primum fusca oblongo-ellipsoidea plana, postea nigra marginibus involutis angustiora in sulco prope ambitum umbilicata.

α. *typica* Williams.

Caulis superne calycesque puberulo-hirsutiusculi. Flores distincte pedicellati; pedicelli calyce plerumque 5–6-plo breviores.

Forma *glabrata*.—Caulis a basi ad apicem calycesque glabri; folia bracteæque margine denticulato-ciliolata.

Syn. *V. rigida* var. *glabrata* Regel, Descr. Plant. nov. rar. Fedtschenko, p. 13, ex Bull. Soc. Nat. Hist. Petersb. 1882.

β. sessiliflora Williams.

Planta tota puberula. Flores brevissime pedicellati. Calyx quam in typo longior, pilis rigidioribus obsitus.

The arrangement of flowers on the stem in *V. rigida* is very curious and worth noting. The plant is often very much branched, and its flowering branches, which spring immediately above the first, or from one of the first two or three internodes, bifurcate and invariably produce unequal branches. The shorter branch is, as a rule, more inclined than the longer branch, and the latter always deviates a little from the direction of the preceding axis. Further, if we note the position which the short branch assumes in a series of successive bifurcations, we see that this position is rigorously maintained in the whole length of the flowering stem and its branches. Thus proceeding from below upwards, note the relative position at the first bifurcation; if the short branch is placed on the left of the observer, the short branch of the bifurcation immediately above it will be placed in front of him; at the third bifurcation it will be placed to the right; at the fourth behind; at the fifth it is finally placed immediately above the short branch of the first. It is further to be noted that in the branches as they are given off higher up along the stem, the short branch referred to is shortened more and more, and at last disappears. In the lower part of the flowering stem it is unusual to find a flower in the angle of the fork terminating the preceding axis; indeed, where the two branches of the fork are developed, and where there is therefore the greater vigour of growth, the terminal flower is most often absent, as if the vegetative force exhausted itself in the production of the two lateral branches. Herein, then, is a fact in which the law of organic balance recognized by naturalists is explained. But then again let it be noticed that about the middle of the flowering axis of the stem, as one of the branches of the fork in each consecutive bifurcation becomes shorter in the manner noted above, the terminating flower of the preceding axis reappears in the angle of the fork. Higher up on the stem it seems that from each node spring two lateral geminate flowers; but the outer one of the two is borne on a very short stalk or peduncle, and provided at the same time with two small opposite leaves. Still further along the stem, this short branch is still further reduced, and then disappears altogether; but it is otherwise with the flowers which terminate the upper internodes of the flowering axis. These are present, and are alternate on the stem; they seem to be lateral and form a loose spike, of which the axis is formed from a succession of internodes, each being a growing axis different from that which precedes it and that which follows it. Vigorous specimens of the species furnish good examples of this interesting mode of branching of the flowering stems. They further afford a satisfactory explanation of the succession of flowers on the stem, which in the growing axis are alternate and solitary, though sometimes in pairs, and near the top become distichous.

The alteration in form of the ripening seeds is not accurately given in the few descriptions of the genus. Bentham & Hooker write "semina orbiculata vel ovata, ad medium faciei interioris concavæ umbilicata." F. Tornabene, on the other hand, says "semina linearia."

I have not seen any quite glabrous specimens similar to those recorded by De Regel from the river Sarawschan, in Turkestan, though some specimens in Herb. Kew. from "Turcomania" are nearly glabrous. The name of "Turcomania," however, does not apply to Turkestan, but at the time these specimens were collected was applied to the region otherwise known as Mesopotamia. All the specimens from Crete which I have examined seem to be nearly glabrous, but they have been so crushed and rubbed in the process of roughing it between the collector and the species-cover in the herbarium that they cannot be relied upon for extending the geographical range of the glabrous form.

Geographical Distribution.

Portugal.—(*Ferreira*, Fl. Lusit. exsicc. No. 178), (*Daveau*, Herb. Lusit. No. 1181), Penedo da Saudade near Coimbra (1886), prov. of Estremadura (*Welwitsch*, No. 131), Vimioso (*Mariz*, 1888), Montargil in prov. of Alemtejo (*Cortezao*), Faro in prov. of Algarve, near Lisbon (*Welwitsch*, No. 68).

Spain.—Gravelly places, dry hills, and borders of fields.—Aragon: Rodanas (*Asso*), Chiprana (*Loscos*).—New Castile: environs of Madrid (*Lange*), Mentrida (*Cavanilles*), Chamartin (*Prolongo*), Aranjuez (*Boutelou*), Almaden (*Torrepando*).—Leon: Valcabado de Paramo (*Lange*).—Murcia: near Murcia (*Lange*).—Andalusia: round Granada (*Willkomm*) and Malaga (*Boissier*).

France.—Dry places, waste-land, and borders of fields.—North slopes of the Pyrenees in the dept. of Pyrénées-Orientales, near Montpellier (*Planchon*) in the dept. of Hérault, Avignon and Carpentras (*Stuart Mill*) in the dept. of Vaucluse, Le Luc in the dept. of Var (*Billot*, exs. No. 1622), Nîmes in the dept. of Gard (*Cherler's* specimens), also in the dept. of Aude, Bouches-du-Rhône, and Drôme; and at C. Corso, in Corsica (*Soleirol*, No. 883).

Italy.—Along roadsides and on dry hills.—Piedmont: near Mondovi.—Tuscany: Romola (*Parlatore*), fields at Pelago, 8½ kilometres from Pontassieve railway station (*Beccari*), Mte. Senario to the north of Florence (*Parlatore*), Mte. Cecioli (*Bertoloni*), Impruneta to the south of Florence (*Bucci*), valley of the Mugnone (*Baroni*), near Florence (the earliest recorded specimens collected by *Joachim Burser*).—Prov. of Rome: Valle dell' Inferno, in the Roman Campagna (*Sanguinetti*).—Campania: Benevento (*Caldesi*).—Apulia: Gallipoli (*Hy. Groves*).—Calabria: near Reggio (*Tenore*).—Sicily: near Messina (*Gussone*), Mandanici (*Nicotra*), Naso (*Todaro*, Pl. Sic. No. 696), Monticelli (*Mina*), Mt. Etna at Brontë, 600 metres (*Strobl*), Palermo (*Reimbole*, It. Sic. No. 1035).—Sardinia: environs of Cagliari, Mte. Urpino, and C. Carbonara (*Gennari*).

According to Bertoloni, the Italian name is "garofanino beccuto." The plant has also been recorded by Stur (1857) from

the Island of Lido, near Venice, but has never been verified, and has not been seen since. On a recent visit to Venice, I went one afternoon to the "bagni" of Lido, and looked for the plant without success. Sig. Adriano Fiori, of the Botanic Garden of Padua, informs me that he does not believe the species is found in the Island of Lido, or, in fact, in any part of the province of Venetia.

Austria.—Dalmatia: Stretto di Morter, Vodiza near Sebenico, and island of Lesina (*Visiani*, Fl. Dalmatica).

Russia.—Prov. of the Don Cossacks: R. Don (*Henning*). Crimea (*Bieberstein*). Trans-Caucasia: W. Caucasus (*Wilhelms*, *Eichwald*), in the govt. of Baku, near Lenkoran on the west shore of the Caspian Sea (*Hohenacker*), and at Limar, 340 metres, further inland (*C. A. Meyer*). Transcaspia: on the east shore of the Caspian Sea (*Karelin*), and along the R. Sarawschan (*Mdme. O. Fedtschenko*).

Bulgaria.—Dermendere and Stenimakhos, in E. Rumelia (*Velenovsky*).

Turkey.—Vilayet of Constantinople: near Constantinople (*Mitcheli*). Vilayet of Adrianople (*Grisebach*). Vilayet of Salonica: near Salonica (*Jurisic*, 1889). Vilayet of Epirus: Mt. Zalougo, near Prevesa (*Baldacci*, It. Albanicum iii. 1895, No. 12 bis); and near Janina (*Baldacci*, It. Albanicum iv. 1896, No. 103). Vilayet of the Ægean Islands: Karpathos (*Pichler*, 1883). Vilayet of Anatolia: Assos (*Sintenis*, It. Trojanum, 1883, No. 978), Borlu (*Tchihatcheff*). Vilayet of Adana: village of Bouloukli, near Mersina (*Balansa*, Pl. de l'Orient, 1855), Mt. Taurus (*Kotschy*, Pl. Taur. 1836, No. 67,—"Saponaria Cretica," not cited by Boissier). Vilayet of Erzeroum (*Szowits*, No. 224). Vilayet of Orfah (*Haussknecht*, It. Syr. Armen. 1865, at 360 metres). Vilayet of Damascus: Dûmâ, near Damascus (*Rev. H. F. Fox*, in Herb. Kew., 1865). Vilayet of Tripoli: the Lebanon (*Kotschy*, It. Syriac. 1855, No. 269).

Cyprus.—Near Kythera (*Sintenis et Rigo*, It. Cyprium, 1880, No. 238).

Crete.—Mt. Lasithi, in eastern Crete (*Sieber*,—not cited by Boissier).

Greece.—Nome of Larissa: near Phersala [Pharsalia] (*Haussknecht*, 1885). Nome of Lamia: between Stylida and Neraida (*Formánek*, 1896). Nome of Attica: on the sunny slopes of Mt. Hymettus (*Heldreich*, *Haussknecht*, 1885). Nome of Achaia: mountains of Boura (*Stuart Mill*,—specimens labelled "Erythræa rigida" in Herb. Kew.). Nome of Laconia (*Heldreich*, 1844); on dry hills.—*Heldreich*, Herb. Græc. norm. No. 694; *Orphanides*, Fl. Græc. (exs. No. 929).

Persia.—(*Kotschy*, Pl. Persiæ aust. 1842, No. 457, Pl. Persiæ bor. 1843, No. 214, *Bunge*, exs. 1858).

Afghanistan.—(*Griffith*, No. 1647, 1839–41), the eastern limit of the species.

Algeria.—Dept. of Constantine: near Constantine (*Choulette*, Fragm. fl. Algér. No. 211), lake of Thelazi (*Lefebvre*). Dept. of Algiers: near Algiers (*Durando*), Sahel d'Alger and forest of

Ksemma, Adjida (*Battandier and Trabut*), Hammah (*Jamin*, Pl. d'Alg. 1851, No. 134). Dept. of Oran: Arzeu (*Munb*).

Marocco.—Agadir, on the west coast, the western limit of the species (*Hooker*, 1871).

This is as full a list of localities and authorities as is desirable for showing the general distribution of the species, from Marocco in the west to Afghanistan in the east. To var. *β sessiliflora* belong the specimens from Piedmont, Campania, Albania, most of the Russian specimens, especially those from Crimea and the Caucasus, and Griffith's specimens from Afghanistan. In the specimens from the south of France, Sicily, and Marocco, the longer peduncles supporting the flowers are more noticeable.

2. V. fasciculata *Boiss.* Diagn. Pl. Or. nov. Ser. i. viii. 92 (1849); Fl. Orient. i. 478.

Glanduloso-hispida, 10–15 centim. Caulis supra basin dichotome ramosus. Folia linearia rigida acuta ciliata subtus trinervia. Flores ad ramorum brevium apicem in fasciculos 5–9-floros congesti. Calyx cylindricus, subæqualiter 15-nervius, dentibus lanceolato-linearibus inæqualibus acuminatis. Petala angustissime linearia pallide rosea saturatius trilineata apice retusa; lamina minima, fauce nuda imberbis. Capsula calyce paullo longior. Semina demum nigra oblonga.

Affinis præcedenti, differt florum dispositione petalisque minoribus imberbibus; calyx fructifer minus tenuis et paullo brevior; semina latiora.

In the type-specimens the calyx-teeth do not seem to be "breviter subulatis," as stated by Boissier, but the calyx is somewhat shorter than in *V. rigida*. In a medium capsule I found eight seeds, and under the lens the hilum of the seed seemed almost at the edge, more so than in the seeds of *V. rigida*. The structure of the petals is well seen in a magnified drawing by E. Desvaux attached to Blanche's specimen in Herb. Kew. The coloured lines are continued right down to the insertion of the claw.

Habitat.—Asiatic Turkey. Vilayet of Anatolia: Valley of Meander, near the ruins of Denislu (Laodicea, in Phrygia) (*Boissier*, 1842). Vilayet of Acre: between Beirût and Brummâna in the Lebanon (*Blanche*, 1849). Vilayet of Tripoli: between the R. Orontes and the town of Latakiyeh (Laodicea, in Syria) (*Boissier*, 1846).

3. V. quadridentata *Sibth. & Sm.* Fl. Græc. Prodr. i. 283 (1806), et Fl. Græca, iv. 81, t. 391 (1823); *Boiss.* Fl. Orient. i. 478; *Williams*, Pinks of Centr. Eur. 3.

Parce glanduloso-hirsutiuscula vel rarius glabra, 10–15 centim. Caulis rigidus, sæpe inde a basi subdichotome divaricato-ramosus. Folia 3–5-nervia ciliata, basilaria rosulata spathulato-linearia, caulina anguste linearia longe acutata, subfloralia margine hyalina distinctius ciliata. Flores solitarii vel gemini et terni, pedicellis crassis calyce dimidio triplove brevioribus suffulti. Calyx oblongo-cylindricus 5-costatus glaber, costis approximatis carinato-subtrinerviis, dentibus lanceolatis rectis apice aciculato-acuminatis. Petala contigua apice quadridentata, dentibus lateralibus minoribus,

fauce barbulata maculata, ungue exserto. Capsula inclusa, calyce brevior. Semina nigra oblongo-ovata.

Habitu *V. rigidæ* similis, sed robustior; specifice diversa calyce costato, ac petalorum margine et fauce.

Specimens found by Dumont d'Urville in the island of Astropalia in 1820, and named by him *V. clavata*, are identical with this plant. The original "description" of *V. quadridentata* is, "Calycibus clavatis glabris, petalis quadridentatis." Sibthorp's own specimens in Herb. Mus. Brit. are labelled "Saponaria pathmica," which seems to imply that he thought the plant came from the isle of Patmos. The calyx-teeth are not "ovatis apice subulatis," as stated by Boissier.

β. Lycia Williams.

Magis glandulosa. Calyx valde glandulosus, pilis sparsis præsertim ad costas obsitus. (*V. quadridentata* Stapf, Beitr. fl. Lycien, Carien, Mesopotamien.)

The type-specimens of this var. are in the Vienna Herbarium.

Geographical Distribution.

Austria.—Dalmatia (*Visiani*).

Greece.—Nome of Corinth: between Nauplia and Port Tolon (*Haussknecht*, 1885). Nome of Attica: Mt. Parnassus at 600 metres (*Heldreich*, Herb. Græc. norm. no. 693), where it grows with *V. rigida*, east side of the island of Ægina (*Heldreich*). Nome of the Cyclades: island of Syra (*Boissier*).

Asiatic Turkey.—Astropalia, the only Turkish island of the Cyclades group (*Urville*, 1820). Anatolia: Smyrna (*Balansa*, Pl. d'Orient, no. 118), Tralles (*Boissier*), river banks nr. Chertek (*Stapf*),—var. *β.* at Gjölbaschi (*Stapf*).

4. V. hispida Boiss. et Bal. in Boiss. Diagn. Pl. Or. nov. Ser. ii. v. 57 (1859); Fl. Orient, i. 479.

Glanduloso-hispidula, a basi (radice subramosa) divaricatim perramosa, ramis alternis et dichotomis. Folia lineari-lanceolata acuta stricta, inferiora 3–5-nervia, superiora 3-nervia. Fasciculi 2–3-flori et flores inferiores solitarii, pedicellis crassis calyce 2–4-plo brevioribus; pedicelli bracteis subulatis instructi. Calyx breviter cylindricus basi attenuatus costato-nervosus viridis demum rubellus acute pentagonus coriaceus, costis rotundatis trinerviis intervallo membranaceo sejunctis, dentibus subulatis acutatis subdivergentibus. Petala acute bifida, fauce nuda. Capsula calyce subbrevior. Semina oblonga.

Species præcedenti atque *V. fasciculatæ* affinis, petalorum formâ omnino distincta.

Both the authentic specimens cited by Boissier are in Herb. Kew. and Herb. Mus. Brit., and the above description is based on the examination of these specimens.

Habitat. Asiatic Turkey.—Anatolia: orchards on Mt. Boz-dagh (*Balansa*, Pl. d'Orient, no. 117 [1854]), and hills nr. Ushak at 900 metres (*Balansa*, Pl. d'Orient, no. 1305_2) on argillaceous limestone.

Postscript.—The distribution of the species has been worked out from the specimens as far as they afford information of localities. It is to be regretted that the localities written on the labels of collectors' specimens generally are so often unsatisfactory. Even when legible, they are frequently no more than the names of villages or hamlets, which are not marked in the best maps or atlases available, or the names of mountain-spurs known to the natives but never indexed in any gazetteer. In the case of Turkish localities, no clue is given either to the vilayet or to the mudirieh in which the place is situated, and there is confusion in the use of Turkish, Frankish and Latin equivalents of place-names. Again, for specimens collected in Greece and the Greek islands, it is desirable to give the modern Greek rather than the ancient Greek or Latin names, and to mention the eparchies and nomes in which these unmapped hamlets are situated. This especially applies to the region comprised in the *Flora Orientalis*, where so many localities have both Turkish and Greek names. The location of streams and hamlets in "Phrygia" or "Cappadocia" conveys no information.

BIBLIOGRAPHICAL NOTES.

XVII.—Steudel's 'Synopsis Plantarum Glumacearum.'

It seems to be generally assumed that Steudel's *Synopsis* appeared as a whole in 1855, the date on the title-page. Pritzel states this, and the new genera are cited in the *Index Kewensis* as of that year. It is probable, however, that the whole of part i. (*Gramineæ*) appeared before that date, presumably during 1854. I have got together the following information, which may interest other workers and be worth putting on record. The book was published in fascicles, of which there were to be eleven, according to a statement in the *Botanische Zeitung* for Jan. 27, 1854, p. 63, where fascicle 1 (pp. 1–80) is noticed; and in the *Bulletin de la Société Botanique de France*, i. (1854), p. 145, where fascicles 1–5 are reviewed. The Paris publication also states that fascicles 1–5 contain fifty sheets. There are eight pages to a sheet, and, as fascicle 1 contained eighty pages, we may assume that each fascicle contained ten sheets.

Part i. (*Gramineæ*), with 474 pages, was issued in six fascicles, as appears from the review in *Flora*, xxxviii. (1855), p. 251, of fascicles 7–9, where it is stated that the sixth fascicle contained the end of the true grasses. The reviewer also expresses the hope that part ii. will be complete before the end of the year, and on p. 604 of the same volume rejoices in its fulfilment, as the concluding fascicle now lies before him. As the subject of this final notice is always referred to in the singular, and as it obviously takes up the work where the previous notice left it, it seems as though there were only ten fascicles, and not eleven, as originally intended. This is also

borne out by the number of sheets, supposing that the fascicles remained equal to the end. As regards the date of publication of individual fascicles, I have gathered the following from the various notices in current periodicals :—

Fascicle 1 was reviewed in Bot. Zeit. xii. 63, Jan. 27, 1854.
,, 2 ,, (with 1) in *Flora*, xxxvii. 125, Feb. 28, 1854.
,, 3, ,, 4, ,, 5 ,, in *Flora*, xxxvii. 703, Nov. 28, 1854.
Part i. (fasc. 1–6) ,, ,, xxxviii. 251, Apr. 28, 1855.

This means that fascicles 1–5 appeared before Nov. 28, 1854. Fascicles 3–5 may have come out together; at any rate I find no separate notices. Moreover they probably appeared in July or August, 1854, as fascicles 1–5 are reviewed in the *Revue Bibliographique* attached to the account of the Proceedings of the Société Botanique de la France, on the sitting of July 12 (Bull. Soc. Bot. Fr. 1854, 145). This number of the *Bulletin* was probably published at any rate before about the beginning of September, as the death of Philip Barker Webb, a member of the Society, which occurred in Paris on Aug. 31, is not recorded till the next number, which contains an account of the proceedings at the sitting of July 29.

There is, in fact, evidence that the whole of part i. appeared in 1854, for N. T. Anderssen, in the *Berättelse om Botaniska Arbeten*, under "Aren 1853 och 1854" (a review of botanical literature for the two years, published at Stockholm in 1856), notices the part thus :—"Gramineæ. *Synopsis Plantarum Glumacearum*. Auctore E. G. Steudel. Fasc. i–vi. Esslingen, 1854." The preface, which with the title-page was issued with the last fascicle (see Bull. Soc. Bot. Fr. *l. c.*), is dated August, 1854. Furthermore, fascicles 7–9, containing the greater part of part ii., were reviewed in the same number of *Flora* (Apr. 28, 1855, p. 253) as part i., and it would seem, therefore, unless fascicles 6–9 succeeded each other very rapidly, that part i. at any rate was complete some little time before that date.

For part ii. (*Cyperaceæ*, *Restiaceæ*, &c.) we have the following dates :—

Fascicles 7–9 (pp. 1–240), reviewed in *Flora*, xxxviii. 253, April 28, [1855.
Fascicle 10, reviewed in *Flora*, xxxviii. 604, Oct. 14, 1855.

Fascicles 7–9 contain almost the whole of *Cyperaceæ*, which end on p. 246, the rest of fascicle containing the remaining orders.

A. B. Rendle.

TWO NEW HIERACIUM FORMS.

By the Rev. Augustin Ley. M.A.

Hieracium cæsium Fr., var. coracinum, nov. var. Original root-leaves rounded, later elliptic and elliptic-lanceolate; these latter acute or acuminate, with pointed teeth, the blade *shortly decurrent*, with 2–4 larger ascending teeth at base; all bright *yellow-green*, lighter beneath, firm in texture. Stem 6–15 in., leafless or with one nearly linear leaf, slightly tomentose, with short white soft hair, branched only at summit. Heads 4–8, on short spreading and ascending peduncles. Bud oval, its phyllaries bending over so that their tips touch at a very acute angle, not tucked in as in ordinary *H. murorum* L. pt. Peduncles with rather dense white tomentum and a few setæ. Phyllaries densely clothed with long white black-based hairs and very few setæ, subobtuse; the shorter outer ones very few. Ligules rather broad, full yellow, their tips naked or almost so, in bud. Style rather dark.

Differing from typical *H. cæsium* Fr. (which grows in the same locality) in the light yellow-green of its leaves, with blade decurrent and deeply toothed at its base; in the compact corymb of sub-umbellate heads, and in the very hairy phyllaries.

Loc. Craig Gledsiau, Brecon Beacons (sandstone), scattered over the cliff, alt. 1500–1800 ft., but not abundant. First observed in 1895, and cultivated since that date.

In cultivation the peduncles lengthen, and the leaves develop more of their characteristic toothing.

Hieracium sciaphilum Uechtr., var. pulchrius, nov. var. Stem about 1 ft., *bearing 2–3 leaves*, *stout*, *erect*, shaggy at base, with long white hairs. Root-leaves *obovate*, *coarsely toothed* with shallow teeth, *obtuse*: petioles and back of the midrib shaggy like the base of the stem. Stem-leaves elliptic or the uppermost ovate, toothed as those of the root, somewhat acute. Corymb *subumbellate*; peduncles straight, floccose but not hairy, beset, as are the dark phyllaries, with numerous setæ. Ligules naked-tipped, style not quite pure yellow. Pappus tinged with reddish brown.

Differing conspicuously from the type in the shorter, stouter, less leafy stem; obovate, coarsely toothed leaves; subumbellate heads with brownish pappus; and darker phyllaries with longer setæ. Growing with the tyye, but quite distinct, and showing no intermediate forms. In cultivation, during a series of years, it has preserved its distinctness.

This plant seems to be quite intermediate between typical *H. sciaphilum* Uechtr. and *H. murorum* L. pt. var. *pulcherrimum* (differing, however, from both in the colour of the pappus): hence the varietal name seemed appropriate, as at once marking the handsome appearance of the plant, and suggesting a passage to *H. pulcherrimum*.

Hab. Mountain cliffs on sandstone and limestone.

Loc. Breconshire: Craig Du and Craig Gledsiau (sandstone),

abundantly; Summit Crag, Brecon Beacons; Craig Cille (limestone). Carmarthenshire: Cliffs of Llyn-y-fan-fechan (sandstone). All these cliffs have a northern aspect. First observed in 1895.

THE AUSTRALIAN FLORA.

At the meeting of the Linnean Society on November 17th, Mr. Spencer Le M. Moore read a paper on "The Botanical Results of a Journey into the Interior of Western Australia, with observations on the nature and relations of the Desert Flora, and on the origin of the Australian Flora as a whole."

The author briefly sketched the physical and botanical features of the district visited, which comprises the country lying east and north-east of Southern Cross, to Mount Margaret and Lake Darlôt. The latitude of 30° S. was indicated as marking, at least in the neighbourhood of Coolgardie, the boundary between two floras; for whereas, to the south of that line, gum-trees (*Eucalyptus* spp.) are common in all districts suitable to their growth, north of 30° they are almost entirely restricted to the banks of creeks, their place being taken there by "mulga" scrub. The soil is usually a red sandy loam, with occasional areas of yellow sand of which *Myrtaceæ* are the predominant inhabitants. The isolated dome-like granite masses known as "gnamma-rocks" have their peculiar flora; such genera as *Keraudrenia*, *Stackhousia*, *Cryptandra*, *Drosera*, *Kunzea*, *Isotoma*, *Thelymitra*, *Pterostylis*, *Borya*, *Centrolepis*, *Notholæna*, *Gymnogramme*, &c., being found there alone. Flowering takes place chiefly in the spring, sheets of everlastings (species of *Helichrysum* and *Helipterum*, *Cephalipterum Drummondii*, &c.) being a prominent feature in the landscape at that time of year. Considering the extremely scanty rainfall, the amount of vegetation carried by the desert is truly marvellous.

From the West Australian Desert, including under that term the country south of the tropic of Capricorn, and east of the 118th degree of east longitude (of the 119th degree south of lat. 32°), 867 species have been obtained, all but seven of which are Phanerogams. One of these is a Conifer, and ninety-one are Monocotyledones. The Phanerogams are ranged under 73 orders and 319 genera: of the latter nearly one-half are restricted to Australia, seventeen per cent. of these latter being endemic in the desert. The total number of West Australian desert species is estimated at from 1000 to 1200.

Compositæ (ninety-seven species) make up eleven per cent. of the desert flora, and *Leguminosæ* with ninety-six species nearly attain premier honours. *Myrtaceæ* follow with eighty-nine species; next come *Amaranthaceæ* and *Proteaceæ* each with forty-seven species, *Goodeniaceæ* with forty-two, *Gramineæ* with forty-one, and *Myoporineæ* thirty-five species. Nearly fifty-eight per cent. of the entire flora consists of species belonging to these eight orders;

leaving forty-two per cent. to be shared between the remaining sixty-five orders.

The current ideas, according to which the flora of Australia, like its marsupials and monotremes, is regarded as a geographical survival, and Australia itself as a sort of "dumping ground" for anything exotic which may be able to reach its shores, were then criticized. While immigration has doubtless taken place, it was held that the extent of it has been greatly over-estimated, and a natural explanation was endeavoured to be given for such immigration, in opposition to the prevalent theories of exotic "predominance."

The "Primitive Tertiary Floras" were regarded as mixed xerophilous and hygrophilous ones. In Europe changes of climate caused elimination of the xerophilous element; whereas in Eastern Australia, until the period of desiccation set in, the climate prevailing in Europe during Eocene, Oligocene, and Miocene times persisted there: hence the mixed hygrophilous and xerophilous nature of its flora. The difference in the floras of Eastern and Western Australia was held to be the result of an earlier desiccation in the western portion of the continent; so that, directly contrary to what occurred in Europe, the xerophilous element flourished at the expense of the hygrophilous. And this, together with its isolation, which has prevented much intermingling of species, explains the floristic peculiarities of Western Australia.

It will be remembered that Mr. Moore described some new species met with during his journey in his paper, "The Camel-plants of Western Australia," published in this Journal for 1897, pp. 161–172.

SHORT NOTES.

Orchis cruenta in Cumberland.—When I was staying in Cumberland last June and July, I found a species of *Orchis* plentiful in two or three bogs on the fells—about 1000 feet above sea level—between Borrowdale and Watendlath. I thought the species was a very stunted form of *O. latifolia*, and therefore did not trouble to gather more than about ten or twelve specimens. The plant has been submitted to Mr. R. A. Rolfe, who identifies it with *Orchis cruenta*, Muhl. in Oeder Fl. Dan. t. 876; Retz Prodr. Fl. Scand. ed. 2, p. 205; *O. latifolia* var. *cruenta*, Lindl. Gen. and Sp. Orch. p. 260: and adds, "Rchb. f. (Fl. Germ. xiii. p. 53) makes it a form of *O. incarnata*, a plant much confused with *O. latifolia* in books, if indeed both are not forms of one species. It is, however, an interesting discovery, as the plant is not previously recorded from Britain. Nyman gives its habitat as "Norv. bor. centr., Suec. bor., Finn." I have placed specimens in the British Museum and the Kew Herbaria.—Herbert Goss.

Stellaria media.—This name stands in the *Index Kewensis* and in the *London Catalogue* on the authority of Cyrilli (Char. Comm. 36 (1784)). He was undoubtedly the first to place the plant in

Stellaria, but purists point out that he did not absolutely conjoin the generic and specific names—the plant stands in his book as "STELLARIA. Linn. Gen. Pl. 586. ALSINE (*media*) petalis bipartitis" &c.—and seek another authority. This has been found in Withering (Bot. Arr. ed. 3, ii. 418 (1796)), who seems to have arrived independently at the conclusion that the plant was a *Stellaria*, and calls it *S. media*, thus retaining the original specific name. Unfortunately this name had been applied in 1794 by Sibthorpe (Fl. Oxon. 141) to a plant which he was apparently the first to name specifically. Withering (*l.c.* 420) renamed this *S. glauca*, saying in a note, "As it appears necessary to introduce the *Alsine media* into this genus, the trivial name affixed to this plant by Dr. Sibthorpe could not well be retained." A conflict between those who uphold the oldest specific name and those who maintain the earliest name in the genus is happily averted by Mr. F. N. Williams, who points out that *Stellaria media* should be cited as of "Villars, Hist. Pl. Dauph. iii. 615 (1789)."—JAMES BRITTEN.

CLASMATOCOLEA CUNEIFOLIA (Hook.) Spruce IN SCOTLAND.—This extremely rare species has to be added to the numerous important additions to the list of Scottish Hepaticæ made by Mr. Symers M. Macvicar, who has sent me very fine specimens for confirmation, collected on birch trees at Moidart, West Inverness. Hitherto it has only been collected sparingly in the British Isles, in the south of Ireland. In the recently published (1898) "Beiträge zur Lebermoosflora Norwegens," Dr. B. Kaalaas recorded its discovery by him in 1895 at Udburfjeld, near Fossan, Norway. These are the only known stations for this peculiar species. The fine specimens sent by Mr. Macvicar would have delighted the late Dr. Spruce, who in a letter some years ago lamented that he had only seen very meagre examples.—W. H. PEARSON.

CERASTIUM ARCTICUM Lange (Journ. Bot. 1898, 493). — The British plant so called in recent years is, I believe, identical with the *C. latifolium* of Smith and Babington, which Sir J. D. Hooker, following Syme, places (as var. *Smithii*) under *C. alpinum*, with the synonym "*C. latifolium*, Sm. not L." I have only once collected true *C. latifolium* in Switzerland, and feel much difficulty about identifying it with our plant; but on this question experts like Messrs. Williams and N. E. Brown are more likely to be right than an amateur field-botanist. However, Dr. Lange himself appears to have accepted our Scottish form as his *C. arcticum*, and determined Mr. Beeby's specimens from Unst as a modification of that. My point is, that we have a species in Britain, whether it should be named *C. arcticum* or *C. latifolium*, distinct from (though nearly allied to) *C. alpinum;* and that it is not a hybrid between two varieties of the latter. That hybrids may occur between *alpinum* and our "*arcticum*" is probable enough; but I am not aware that any such have yet been found in Britain.—E. S. MARSHALL.

HABENARIA VIRIDIS var. BRACTEATA (Journ. Bot. 1898, 438).—The first publication of this name should stand as "[Reichenbach

ex] A. Gray, Man. Bot. Northern United States, 5th ed., p. 500 (1867)."—O. A. Farwell.

Rubus Bakeri.—The Rev. W. Moyle Rogers has now identified the small rhamnifolian bramble reported from Cantire and Argyle (Journ. Bot. 1898, 338) as *R. Bakeri* F. A. Lees, described in Bot. Record Club Report, 1887, 120.—C. E. Salmon.

NOTICES OF BOOKS.

Contributions towards a Cybele Hibernica, being Outlines of the Geographical Distribution of Plants in Ireland. Second Edition, founded on the papers of the late Alexander Goodman More, F.R.S.E., F.L.S., M.R.I.A., by Nathaniel Colgan, M.R.I.A., and Reginald W. Scully, F.L.S. Dublin; Ponsonby: London; Gurney. 8vo, cloth, pp. xcvi, 538, map. Price 12s. 6d. net.

Flora of the County Donegal, or, List of the Flowering Plants and Ferns, with their localities and distribution. By Henry Chichester Hart, B.A., F.L.S. Dublin; Sealy: London; Nutt. 8vo, cloth, pp. xxiv, 392, map.

A new edition of the *Cybele Hibernica* has been for many years a desideratum, as the earlier issue (1866) was not only difficult to procure, but was practically obsolete. Although there is even now plenty of room for work in Ireland, and discoveries of interest doubtless remain to be made, the pages of this Journal during the last thirty years have shown that a great advance has taken place in our knowledge of the "distressful country" in its botanical as well as in other aspects. Many important papers on the Irish flora have appeared also in the *Irish Naturalist* and in the *Proceedings of the Royal Irish Academy*; while separate works, such as *The Flora of North-east Ireland*, Mr. Allin's Flora of Cork, and now Mr. Hart's Flora of Donegal, have dealt more or less exhaustively with definite districts. It was high time that all this material should be correlated.

It is of course well known that the production of a new edition of this *Cybele* had occupied the time and thought of Mr. A. G. More during the last ten years of his life, and the present editors have carried out his wish in bringing his undertaking to a satisfactory issue. Well qualified for the task by their own acquaintance with Irish botany, they had the additional advantage of close intimacy with More, and, as they say in their preface, "a fuller acquaintance with his views than was possessed by other Irish botanists."

The hundred pages of introductory matter include lists of the principal books, papers, MSS., and herbaria relating to the Flora of Ireland, followed by the introduction proper, in which the physical features and climate of the country are dealt with, the flora is compared with that of England, and other preliminaries connected with distribution are discussed. A table of distribution throughout the twelve districts, originally suggested by the late Professor Babington, is followed by the body of the work. The "excluded species" are

placed in an appendix, and this is the only part of the arrangement which we are inclined to criticize. It is probably a reaction from the undue prominence which is sometimes given to these "errors, casuals, and aliens not fully naturalized" in some floras: but we are of opinion that it is better to include them in their proper places in the general enumeration, indicating their comparative unimportance by a difference of type. The absence from the flora proper of such plants as *Ranunculus arvensis*, *Helianthemum vulgare*, *Stellaria aquatica*, and many more, is, however, perhaps rendered more striking by the arrangement here adopted.

To criticize the book in detail would require a far more extensive knowledge of the Irish flora than the present writer can boast. Nor indeed is such criticism necessary, for the *Cybele Hibernica* will of course be the text-book for all who are concerned with botany in Ireland, and will thus be put to the best of all tests. We note that, although the arrangement follows that of the ninth edition of the *London Catalogue*, the nomenclature is that of the earlier *Cybele*—a compromise which is probably convenient for Irish botanists, who may justly plead the still unsettled state of our nomenclature. Care seems to have been taken with the genuine Irish names, although nothing like an exhaustive catalogue of these is attempted; but we regret that the absurd convention that every plant must have an "English name" is adhered to. We trust that no self-respecting Irishman will allow himself to mention such Saxon absurdities as the "Paradoxical Sedge," which would seem more in place in Lear's 'Nonsense Botany' than in a scientific work. We note that the name "St. Patrick's Cabbage," commonly applied in books to *Saxifraga umbrosa*, seems to have been a mistranslation of the Irish name "Fox's Cabbage," due to "the close similarity of sound of the genitive forms of the Irish words for 'Patrick' and 'fox'"; the other Irish name, "Good People's Cabbage," confirms this view, the connection in folklore between foxes and fairies being closer than might be supposed.

A word must be said in praise of the admirable arrangement and general "get-up" of the book. It is printed in clear and well-contrasted type, and bound in such a manner as to open easily. The heading of each page shows the order and genus under treatment; and we are glad to note that everything is included in one index. It may be said that these are small matters, but they are of a kind which materially affect the practical use of a book.

In the *Flora of Donegal*, the outcome of Mr. H. C. Hart's thirty-three years' work on the botany of the county, we have another evidence of the influence of A. G. More; it was with his "advice and assistance that this flora was commenced and carried out," and to his memory it is fitly dedicated.

A fourth part of the volume is taken up with introductory matter—topography, geology, geographical distribution, and the like: and another hundred pages at the end of the work are devoted to considerations connected with climate and an appendix dealing with plant-names and plant-lore—matters which we think might well receive more attention than they usually do at the hands of

local workers. All these accessories are carefully and—so far as the observations in climate are concerned—even elaborately worked out; it is evident, indeed, throughout the book, that Mr. Hart has spared neither time nor pains in its compilation.

The flora proper contains many interesting notes which could only have been written by one who was well acquainted with the plants in the field, but we are glad to see that Mr. Hart does not encumber nomenclature by bestowing names upon the forms he indicates. He has been fortunate in obtaining Mr. Hanbury's help for the *Hieracia*, while Mr. Arthur Bennett has been consulted with regard to *Potamogeton* and *Carex*. We note that Mr. Bennett confirms *Arabis ciliata* as a Donegal plant: we are inclined to agree with the authors of the Irish *Cybele* (who do not give it for Donegal) that this plant is "very doubtfully entitled to sub-specific rank." The naturalization of *Veronica peregrina* as a garden weed and the phenomenal rapidity of its reproduction suggest that this may in time extend itself beyond cultivation and become an integer of the local flora. Another complete naturalization is *Mimulus luteus* of our English books, which Messrs. Colgan and Scully more correctly name *M. guttatus* DC. The note on *Menyanthes* may be taken as an example of those scattered through the book:—"This species is more effective than any other bog plant in overgrowing and filling up shallow boggy lakes. Growing from the margin outwards, it speedily spreads a mat over the surface of the water or soft mud, which in time harbours other species and at length converts to peat. Its great power of root-spreading enables it to act thus, and also, perhaps, renders it less dependent for its existence upon seed-reproduction. The quantity of buckbean to be seen flowering bears a very small proportion to that occurring barren." We are glad to see that Mr. Hart does not feel it incumbent on him to bestow a manufactured "English name" on every species he enumerates.

The weak point of the book is its bibliography. There is no list of works quoted, and the references in the text are absolutely useless for the purposes of consultation. Our own journal, for example, is quoted simply as "Jour. of Bot.," neither name nor year being added; and this is practically no information at all, seeing that the Journal is now in its thirty-seventh year. "Proc. R.I.A." is scarcely more useful: indeed, it must be allowed that this department of the Flora has been practically neglected, to the detriment of the work as a whole. With this exception, the book, which is creditably printed although many misprints have escaped notice, is a valuable addition to our steadily increasing series of local floras.

An Elementary Text-book of Botany. By Sydney H. Vines, M.A., D.Sc., F.R.S. 8vo, pp. xv, 611, with 397 figures in the text. London: Sonnenschein. 1898. Price 9s. Weight 2 lb. 8 oz.

The preparation of this work was undertaken to meet a demand which appeared to exist for a less bulky and expensive volume than the author's *Student's Text-book of Botany*. The new book is intermediate in size between the last English edition of Prantl's

Text-book and the *Student's Text-book*. It strongly recalls the latter, of which it is practically an abridgment, brought more up to date, with "the omission of certain difficult and debatable topics, such as, for instance, the details of nuclear division, or the alternation of generations in the Thallophyta." Prof. Vines hopes at some future time to render the difference between the two more marked, by preparing an edition of the larger book of a more advanced character and on a somewhat larger scale. Unless this is done, the *Student's Text-book* will probably fall into disuse, for the new book contains sufficient subject-matter for the majority of those who would buy one or the other; while as regards difficult and debatable topics it is better for the student to hear about these directly from his teacher. We are glad to note one alteration, namely, the placing of the section on Physiology after the Anatomical, instead of at the end of the book after the Systematic portion, as in the *Student's Text-book*; except for this the book runs on exactly the same lines as the larger work. Parts 1 and 2, dealing respectively with external morphology and anatomy and histology, are good introductions to the study of plant structure, while Part 3, on physiology, is excellent as far as it goes. We miss, however, from the latter, that side of the study of plant-life in relation to its environment which the Americans call ecology, and which is perhaps the most attractive part of botany, for it is the study of plants living and growing out of doors. In fact, Part 3 as a whole savours rather of the laboratory. Part 4 deals with classification and special morphology. The plant-world now falls into five groups; the recent discoveries which have emphasized the nearness of Gymnosperms and Pteridophytes have caused the elevation of Gymnosperms and Angiosperms, formerly regarded as subdivisions of one group—Phanerogamia—into distinct groups, each comparable with Thallophyta, Bryophyta, or Pteridophyta. The account of Group I., Thallophyta, differs only from that of the *Student's Text-Book* in the omission of detail. The Algæ are arranged under the four old colour-groups, while Fungi comprise the six subclasses, Schizo-, Myxo-, Phyco-, Asco-, Ascidio- and Basidio-mycetes. We should like to have seen some revision of this arrangement, bringing it more in accordance with recent views. The treatment of Group II., Bryophyta, also follows closely the larger work. As the blocks of *Marchantia* are getting very worn, we will hope for the detailed description of a more typical thalloid Hepatic in a future edition. In Pteridophyta we note that the Eusporangiate and Leptosporangiate character takes precedence of that based on homospory and heterospory. This brings *Isoetes* next to the *Ophioglossaceæ* and *Marattiaceæ*. The account of the Angiosperms differs only in the omission of the less important orders, and the transference of *Euphorbiaceæ* from *Discifloræ* to *Monochlamydeæ*. The systematic arrangement of this group is the least satisfactory part of the book. Owing largely to the work of the Berlin school, considerable advance has been made in systematic botany during the last few years; the classification both of Monocotyledons and Dicotyledons adopted by Professor Vines is

like a look back into the dark ages, and one is not surprised to find that *Najas flexilis* is still the only British species of the genus. We would suggest that in his contemplated more advanced text-book, which we shall anxiously expect, Professor Vines should get a systematist to do the systematic account of seed-plants, and thereby recognize that differentiation of labour which, we were wont to learn in the old days, is a criterion of development.

A. B. R.

Pflanzen-Geographie auf physiologischer Grundlage. Von Dr. A. F. W. Schimper. Pp. xviii, 876, with 502 drawings and reproductions from photographs, 5 collotypes, and 4 geographical maps. Jena: Verlag von Gustav Fischer. 1898. Price 27 m.

The science of œcology is defined by Haeckel to be "the knowledge of the sum of the relations of organisms to the surrounding outer world, to organic and inorganic conditions of existence; the economy of Nature, the correlations between all organisms living together in one and the same locality, their adaptations to their surroundings, their modification in the struggle for existence, especially the circumstances of parasitism," &c. In the cheap and handsome volume before us, Dr. Schimper, in applying the science of œcology to the vegetable kingdom, has made an exceedingly important contribution to botanical literature, and the book will be eagerly welcomed and read by all who are in any way interested in plants.

The author treats his subject under three great divisions. In the first, entitled "Factors," he discusses soil, temperature, light, &c., and, as of especial importance, the presence or absence of water. Thus we get the three great vegetation types, Hygrophytes, Xerophytes, and Trophophytes—those that are adapted to moist regions, to desert lands, or to recurring wet and dry seasons. The conditions that have developed these different classes of plants may be due to climate or to the state of the ground (adaptive influence), and these two influences may come into play in very close proximity. On the Sahara we should look mainly for Xerophytes, though here and there in the scattered oases we should find colonies of Hygrophytes.

The second great section of the book deals with "Formations and Associations." These formations of various kinds of vegetation are also due to the influence of climate and ground. Under "Associations" he includes those plants that depend on others for support, shelter, or food. The final division is devoted to "Zones and Regions," and to the flora more particularly characteristic of each. This is by far the largest section of the book, and deals in succession with the tropics, the temperate and the arctic zones, the plants that inhabit mountain regions, and water flora. In the tropics the periodic alternations of wet and dry seasons, the intense sunlight, and hot wind have all to be met by the plants with corresponding protective adaptations. In the arctic regions the climatic conditions are also paramount; the plants have to encounter

intense cold, and the long season when they can absorb no moisture has caused them to develop characters such as we find in desert-plants.

Dr. Schimper has treated the whole subject in an exhaustive and scientific manner, and has shown how outward form and internal structure are modified in order that the organisms may adapt themselves to their environment and live under the most adverse conditions. Copious bibliographies and a wealth of illustrations enhance the usefulness of the book, of which we understand an English translation is in preparation.

Selected Papers from the Kew Bulletin. I. Vegetable Fibres. H. M. Stationery Office. 8vo, boards, pp. 280. Price 3s. 6d.

From the prefatory note contributed by Dr. Dyer to this volume, we learn that it "may from time to time be followed by similar collections." We venture therefore to offer a few suggestions which, if adopted, will contribute materially to the usefulness of future issues.

It seems incredible that a collection of this kind should be issued without the faintest ghost of an index; but such is the case. There is an entirely inadequate "table of contents," in which each paper is entered in the order of its appearance, prefaced by the number of the "article" in Roman numerals—surely an obsolete and inconvenient method of enumeration — but of index there is none; and the "convenience" of reference, which is the ostensible object with which this collection is issued, could not be more completely ignored. And, to make matters worse, there are no headings to the pages!

The articles seem to have been brought together without any attempt at combination; so that, for example, the entry "XXI. Ramie" is followed by four other numbers called "Ramie (continued)," and this heading duly figures as many times in the body of the book. The purely formal headings to what is often a purely formal correspondence are published in full; many of the letters—mere official acknowledgements of documents or specimens—cannot be of the slightest possible interest or value. We have always wondered why they were included in the Kew Bulletin, but their republication is incomprehensible.

It is probable that in these pages there is much information of practical importance, although we fail to see the necessity for reprinting matter which has already been made publicly accessible, and some of which must be already obsolete; but those who wish to find such information about any given plant will have to hunt it out for themselves. If books of this kind—representatives of the class of *biblia a non biblia*—are of any value (as to which we express no opinion), that value depends mainly upon the readiness with which their contents are made available for consultation.

ARTICLES IN JOURNALS.

Annals of Botany (Dec.).—W. F. Ganong, 'Comparative Morphology of embryos and seedlings of Cactaceæ' (1 pl.).—H. H. W. Pearson, 'Anatomy of seedling of *Bowenia spectabilis*' (2 pl.).—J. R. Green, 'The alcohol-producing enzyme of yeast.'—H. Wayler, 'The nucleus of the Yeast-plant' (2 pl.).—S. H. Vines, 'The proteolytic enzyme of *Nepenthes*.'

Bot. Centralblatt (Nos. 49, 51). — R. H. True & C. G. Hunkel, 'The poisonous effect exercised on living plants by phenols' (cont.).—(No. 49). B. Schmid, 'Bau und Functionen der Grannen unserer Getreidearten' (concl.).—(No. 50). E. Schwabach, 'Vorgänge bei der Sprengung des mechanischen Ringes bei einigen Lianen' (1 pl.). — (No. 51). C. Warnstorf, 'Zur Kenntniss exotischer und europäischer Torfmoose.'

Bot. Gazette (19 Nov.).—E. A. Bessey, 'Comparative morphology of pistils of *Ranunculaceæ*, *Alismaceæ*, and *Rosaceæ*' (1 pl.).—L. C. Riddle, 'Embryology of *Alyssum*' (3 pl.).—C. L. Pollard, 'Eastern acaulescent Violets.'—E. B. Copeland, 'A new self-registering transpiration machine.' — W. W. Rowlee & G. T. Hastings, 'Seeds and seedlings of *Amentiferæ*' (1 pl.).—J. J. Davis, *Doassansia Zizaniæ*, sp. n.

Bot. Zeitung (1 Dec.).—C. van Wisselingh, 'Ueber den Nucleolus von *Spirogyra*' (1 pl.).

Bull. Soc. Bot. France (xlv. 3–4; Sept.).—A. Chatin, 'Nombre et symétrie des faisceaux libéro-ligneux du pétiole.'—C. Picquenard, 'Lichens foliacés des forêts du Finistère.'—A. Franchet, *Omphalogramma* (gen. nov., Primulaceæ).—P. Candargy, 'Flore de l'île de Lesbos' (concl.) (xlv. 5, Oct.).—P. Van Tieghem, 'Structure du fruit, germination et structure de la plantule de la *Nuytsia*.'—M. Gandoger, 'Plantes de Russie.'—J. A. Battandier, 'Quelques plantes d'Algérie.'—F. Debray, 'La maladie de la brunnisure.'—E. Roze, 'Des Rhizotomes, les premiers botanistes Grecs.'—E. Mer, 'Réserve amylacée des arbres.'

Erythea (8 Nov.).—J. B. Davy, *Stapfia* (n. gen. *Meliceæ*) (1 pl.).

Gardeners' Chronicle (26 Nov.).—C. T. Druery, 'Fern crests' (10 Dec.). G. C. Jenman, *Danæa nigrescens* and *Pteris Harrisonæ*, spp. nn. *Cirrhopetalum appendiculatum* (fig. 118).—(17 Dec.). *Neobenthamia gracilis* (figs. 124, 125).

Journal de Botanique ("1–16 Octobre," received 7 Dec.).—E. Bescherelle, 'Bryologiæ Japonicæ Supplementum I.' (concl.).—E. Gadeceau, '*Lobelia Dortmanna* dans la Loire-Inférieure.'—A. Franchet, 'Plantarum Sinensium ecloge secunda' (*Aristolochiaceæ* ("1 Novembre," received 14 Dec.).—A. Franchet, 'Chinese Juglandaceæ.' — A. Le Jolis, 'Protestation contre le Revisio Generum Plantarum.'—E. G. Camus, 'Plantes hybrides de la flore européenne' (cont.).

Oesterr. Bot. Zeitschrift (Dec.).—R. Schlechter, 'Revision der Gattung *Holothrix*' (cont.).—E. Nikolic, 'Phänologische Mittheilungen aus der Winterflora Ragusas.'—J. Bornmüller, *Vinca Haussknechtii*, sp. n.

Philosophical Transactions (Nov.).—G. Murray & V. H. Blackman, 'The nature of the coccospheres and rhabdospheres' (2 pl.). V. H. Blackman, 'Cytological features of fertilization and related phenomena in *Pinus sylvestris*' (3 pl.).

BOOK-NOTES, NEWS, &c.

At the meeting of the Linnean Society on Dec. 1st, Mr. R. H. Biffen read a paper on the biology of *Agaricus* (*Collybia*) *velutipes* Fr. Pure cultures of this fungus were grown on blocks of sterilized horsechestnut wood kept moist with wads of cotton-wool soaked in water, under varying conditions of aëration and illumination. Four weeks after infection minute sclerotia were produced analogous to those found in some other species of *Collybia*—e. g. in *C. tuberosa*. From these one or two sporophores were formed directly, similar, except in size, to those found in nature. They dry up in a week or two, and appear to be dead, but then produce a second crop of sporophores, which may in turn produce others, either from the pileus or stipes. It is therefore suggested that the great reduction in the sclerotia is to be correlated with this mode of vegetative reproduction, the sporophores themselves being able to function as sclerotia under certain conditions. On tracing the development of the sporophore, it was found that the gills were exposed from the first, and that the only approach to the formation of a *velum partiale* was afforded by the hairs of the recurved margin of the pileus pointing towards the stipes. It is thus completely gymnocarpic. A "conducting-system" was found running through the stipes and lower part of the pileus into the gills, where it ended in bulbous dilations, or in the cystidia. The hyphæ of the cortex of the upper part of the pileus turn outwards and give rise to three distinct sets of hairs. As no evidence could be found for the formation of mucilage by these, it was suggested that the sliminess of the pileus is due to a quantity of water being held among them by capillarity. Microscopic examination of a series of infected blocks showed that the mycelium first formed in the wood elements became broken up into oidia, which quickly germinated and so gave rise to a large mycelium. The destruction of the wood is due to the corroding out of definite tracks in the cellulose walls of the thickening layers of the wood elements. The lignin of the middle lamella is left unaltered even in much-diseased wood. If, however, xylose-yielding substances are extracted from the blocks before infection, the lignin is attacked; although, if the extracted blocks are treated with a dilute solution of cane-sugar, the hyphæ again attack the cellulose only.

Mr. J. B. Carruthers, who went to Ceylon in the autumn of 1897, is expected home about the end of this month. He went out at the request of the Planters' Association of Ceylon to investigate a disease that was working havoc among the cacao trees, as much as fifty per cent. of the cacao crop being "destroyed or rendered of much

inferior value." The two reports which Mr. Carruthers has already issued in March and October indicate most successful results, not only in diagnosing the disease but in suggesting cures, and, what is of still more importance, in advising measures that will prevent it from spreading.

Dante's Garden, "with legends of the flowers," by Rosemary A. Cotes (Methuen; sm. 8vo, pp. 110, price 3s. 6d. net), is a very pretty and entirely unnecessary little book. If Dante had said much about flowers, and if the author had dealt only with this, the collection of passages might have been interesting; but he said very little. Mr. Paget Toynbee, who writes a short preface, says "sometimes a point has been stretched in order to include such flowers as the narcissus, the veronica, and the passion-flower [not to mention the daisy and the star of Bethlehem], to which Dante does not actually refer, but the reader will probably not be inclined to cavil on this account." That depends on the reader: for ourselves, we not only "cavil" at, but regard as absurd, the introduction of the passion-flower, which was not known to exist until long after Dante's time. As to the "legends," they are of the baseless order which cause confusion and despair to the critical folklorist: anything more ridiculous than the story of what happened to St. Augustine "on his tours round the south of England" we have never met with, and his sermon on the daisy chain must be entirely the outcome of the author's by no means brilliant imagination.

The Royal Horticultural Society has published a *Catalogue of the Lindley Library* (price 2s. 6d.), which should be of service to the Fellows of the Society and to others who may wish to consult the books stored at 117, Victoria Street, and who for that purpose need to know of what the library consists. A short introduction gives the history of its formation, the body of the book being occupied by the catalogue proper, arranged under authors. It appears to be carefully done, but it is to be regretted that each page is not headed with the name of the author under notice, as is done in all good catalogues: at present one opens upon "Text Book of Botany" or "French edition," and it is necessary to turn back to find the context. A short list of the MS. Journals and correspondence and of the portraits in the Society's rooms is appended; the former include those of G. Don (1821–23), D. Douglas (1823–27), J. Forbes (1822–23), R. Fortune (1842–45), T. Hartweg (1836–47), J. Macrae (1824–26), J. D. Parks (1823), and J. Potts (1821–22).

The *Annals of Botany* for December contains a very interesting biography of George Bentham by Sir Joseph Hooker.

Although the language in which Dr. Grecescu's new Flora of Roumania (*Conspectul Florei Romaniei*: Bucuresti, Tipografica Dreptatea; Berlin, Friedländer: 8vo, pp. 836: price 15 lei) is unfamiliar, it is evident that he has given us in this handsome and well-printed volume an extremely careful account of the botany of that region. The bibliography is both full and critical, and includes the plants of both early and recent collectors: thus the species enumerated by Robert Townson in his *Travels in Hungary* (1797)

are duly taken up, and are sometimes referred to species other than those to which they have been assigned—e. g. "*Saxifraga rivularis* Townson non L." = *S. carpatica*. There are new species—e. g. four *Hieracia*, and new names—*Ononis spinescens*, which = *O. spinosa* M. Bieb. non L.; these, we think, should have been accompanied by a Latin diagnosis. The book is clearly one which will repay careful investigation. The vernacular names, which look very odd to English eyes, are very fully given.

Mr. J. G. Baker, who retires from the Keepership of the Kew Herbarium on the 12th of this month, will be succeeded by Mr. W. B. Hemsley.

We are glad to see that the second part of Mr. Fryer's Monograph of British Potamogetons has appeared.

A new part (the 24th) of M. Pierre's *Flore Forestière de la Cochinchine* has been issued, bearing the date Sept. 1, 1898. It contains numerous new species, with figures, of *Anacardiaceæ*, *Connaraceæ*, and *Leguminosæ*. We observe that, either by accident or design, the name *Buchanania* is printed throughout *Buchaniana* —a form hitherto unknown.

We have received the first part of what will evidently be an important work—*Symbolæ Antillanæ*, "seu Fundamenta Floræ Indiæ Occidentalis," by Prof. Urban (Berlin, Borntraeger: 8vo, pp. 192, price 10m. 80). This instalment is devoted to the bibliography of the subject, and is very carefully and exhaustively done —indeed it seems to us almost *over*done, so full is the information given as to individual papers of comparatively little importance. We cannot think that it is necessary to furnish papers which can only be referred to once in the work with an abridged title and a place in the bibliography; thus—to take the first example we open at—Mr. C. L. Pollard's paper entitled "*Cassia proboscidea* n. sp." is abridged "Poll. Cass. prob.," and similar examples are numerous. But the more important contributions to our knowledge of West Indian botany are admirably treated; to Patrick Browne and his work, for example, eleven pages are devoted, full of important and useful information. We are glad to see abundant testimony to the usefulness of the *Biographical Index of British Botanists*, first published in this Journal.

A year ago we noticed the first volume of a *Botanisches Bilderbuch für Jung und Alt*, by Franz Bley, and we now receive from the publisher (Gustav Schmidt, Berlin) the second instalment, containing the plants to be met with from June to September. As in the first volume, there are twenty-four plates, each containing nine small, but very pretty and accurate, coloured figures. There is appropriate text, by H. Berdrow, and the volume (in a pretty cover) is not dear at 6 marks.

The third part of Mr. Hiern's Catalogue of the Welwitsch Collections makes its appearance as we are going to press. We hope to say something about it in our next issue.

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CONTENTS.

PAGE

The Alga-Flora of Cambridgeshire. By G. S. WEST, B.A., A.R.C.S. (Plate 394) 49

New Somali-land Plants 58

Notes on *Saxifraga*. By JAMES BRITTEN, F.L.S. 66

Botanical Excursions in W. Donegal, 1898. By H. C. HART, F.L.S., &c. 70

Biographical Index of British and Irish Botanists. By JAS. BRITTEN, F.L.S., and G. S. BOULGER, F.L.S. First Supplement (1893–97) (concluded) 77

SHORT NOTES. — Berkshire Plants. — *Physcomitrium sphæricum* in Surrey.—*Chenopodium capitatum* Aschers. 84

NOTICES OF BOOKS :—

History of European Botanical Discoveries in China. By E. BRETSCHNEIDER, M.D. 86

LEGRÉ (Ludovic). La Botanique en Provence au XIVe Siècle .. 88

Grundzüge der geographisch-morphologischen Methode der Pflanzen-systematik. Von Dr. R. v. WETTSTEIN 92

Articles in Journals 93

Book-Notes, News, &c. 94

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THE ALGA-FLORA OF CAMBRIDGESHIRE.

By G. S. West, B.A., A.R.C.S.,

Scholar of St. John's College, Cambridge.

(Plates 394–396.)

Very little is known concerning the Freshwater Algæ of the eastern counties of England, only a few scattered records for Norfolk and Essex* and two lists of Hertfordshire Diatoms† having been published. As yet no work has been done at the algæ of Cambridgeshire, and the present paper is one which will serve as a basis upon which the alga-flora of the county can be gradually accumulated. It is the result of an examination of a large quantity of material collected systematically from various parts of the county during the past few years, the collections being made at all seasons of the year, and often in this way from the same locality under varying conditions. The greater part of the collections were made by myself, but I am also indebted to my brother, W. West, Jun., B.A., for some gatherings from several places in the county. The whole district yields but a meagre assortment of this class of plants, and I doubt very much whether any other county in England, of equal area, possesses so poor an alga-flora. Taken as a whole, the collections were exceptionally poor, little variety in the way of species being found; and it has only been by a very diligent search, in the light of much previous experience, that I have been enabled to obtain many of the species included in the following account. Most orders of the Chlorophyceæ (or green algæ) are represented to a greater or less extent, and the Myxophyceæ (or blue-green algæ) are moderately represented, those forms bearing heterocysts being fewer than those without; but the Florideæ (or red algæ) are only represented by a single species, and the Fucoideæ (or brown algæ), of which only a few freshwater genera exist, not at all.

The geological formations of the county, factors which play such an important part in determining the alga-flora of a district, are particularly unsuitable for the existence of an extensive and varied collection of algæ, although it is highly probable that many good things existed on Gamlingay Heath (situated on the Lower Greensand) prior to the time it was drained. The topography of the county is not sufficiently diversified, and, owing to the general low level, none of the peculiar mountain gatherings are forthcoming, few Myxophyceæ being found, and, comparatively, still fewer Desmids. The scarcity of the latter is remarkable, only ten out of twenty-four British genera being represented, and these but scantily.

The two most fruitful localities for Desmids are undoubtedly the fens at Wicken and Chippenham, each being a small remnant

---

* M. C. Cooke, *British Desmids*, and also in *Grevillea* at various times; W. West & G. S. West, 'Contrib. Freshw. Alg. S. of England,' Journ. Roy. Micr. Soc. 1897, 467–511, pl. vi. & vii.

† I. Robinson, Trans. Hertfordsh. Nat. Hist. Soc. iii. 1–9 (1884); iv. 196–200 (1887).

Mo. Bot. Garden,
1900.

of almost primæval fen; but even these are far from prolific. The small pools on the latter, containing *Chara hispida* and a reduced form of *Utricularia vulgaris*, yielded some rather striking species, as also did the pools and peaty ditches on Wicken Fen containing *Utricularia vulgaris* and *Nymphæa alba*. The strange appearance of *Cosmarium anceps*, *C. angustatum*, and *C. Holmiense* at Chippenham is worthy of mention, these species being as a rule entirely confined to upland or subalpine districts, being a marked feature of the dripping carboniferous grits and shales of the Pennine Chain and of similar situations among the older rocks of the Lake District, North Wales, &c. They are notably absent from the south-eastern counties of England, and to them may be added *C. speciosum*, which may be placed in the same category, although it is found in Epping Forest, Essex. Roswell Pits, Ely, was found to be a locality productive beyond the average, and not a few uncommon species were obtained from Dernford Fen, about one mile south of Shelford. The chalk districts of the south-east of the county yield practically no algæ, and the numerous ditches and drains of the northern and central parts—many of the larger of which have been in existence since the seventeenth century—exhibit a monotony which could only be found in a low-lying level country. The entire absence of submerged *Sphagnum* and *Sphagnum* bogs causes a corresponding absence of many forms of algæ, and especially certain Desmids, which are more or less exclusively found in such localities. Some of these, such as *Cylindrocystis Brebissonii*, *Closterium striolatum*, *Tetmemorus granulatus*, *Micrasterias truncata*, *Euastrum binale*, *Staurastrum margaritaceum*, &c., are really common and widely distributed species throughout the British Isles, and their absence from Cambridgeshire is therefore all the more noteworthy.

On the whole I think the Diatoms may be considered as moderately representative, although most of the upland forms are naturally absent, and there is a marked absence of species belonging to the genera *Eunotia* and *Melosira*. I say "most of the upland forms" because there are a few found at Wicken and Chippenham, such as *Achnanthidium flexellum*, *Epithemia Argus* var. *alpestris*, and *Eunotia flexellum* var. *biceps*, which are precisely analogous in their distribution to those Desmids (*Cosmarium anceps*, *C. angustatum*, and *C. Holmiense*) previously mentioned, and the presence of these species in the marshes of a flat country only about ten feet (or less) above the sea-level is quite inexplicable to me, as their natural home is amongst the mosses and algæ of the rocky gills and glens of the mountainous portions of the British Isles and other parts of Europe; it is one of those strange facts in the study of the distribution of these plants which are being continually brought forward by the advancement of our knowledge in this direction, and concerning which algologists can at present offer no opinion. A precise parallel to this is found in the occurrence of *Cetraria islandica* (Iceland moss) on some of the Lincolnshire heaths, a species with the distribution—"Frigid and Alpine Europe, N. America, and Himalayas."*

---

* Leighton, *The Lichen-flora of Great Britain*, 1879, 91.

Of recent years, and since the publication of the latest English text-books, the classification of the freshwater algæ has changed very greatly. Many of the old orders and families, founded on merely transitory or conditional characters, have had to be abolished, and a state more or less of chaos has had to be reduced and consolidated into what may now be fairly claimed to be the foundation of a natural system. In the Chlorophyceæ many of the genera considered at one time as doubtfully distinct have been proved either to be valid or identical with others. *Hormiscia* and *Ulothrix* have been united under the first-named genus, *Glœocystis* and *Chlorococcum* under *Glœocystis*, and the characters which constituted the genera *Mougeotia*, *Mesocarpus*, *Staurospermum*, *Plagiospermum*, and *Craterospermum* have all been found to be present in one species.* Wille's discovery of the occurrence of oogonia and antheridia in *Cylindrocapsa*† has necessitated the removal of this plant from the Palmellaceæ to a new order—Cylindrocapsaceæ—in close proximity to the Œdogoniaceæ; and the discovery of sexual organs in *Aphanochæte*‡ also requires a transference of this genus from the Chætophoreæ to the Coleochætaceæ. The energetic investigations of Prof. G. von Lagerheim and others have shown that many of the Protococcaceæ, which were regarded at one time as doubtfully distinct and in consequence relegated by Bennett and Murray§ to the "Protophyta," are really distinct organisms possessed of a complete, if simple, life-history of their own.

Bornet and Flahault's *Revision des Nostocacées Hétérocystées*‖ and Gomont's *Monographie des Oscillariées*,¶ two splendid works the value of which cannot be over-estimated, have put the filamentous Myxophyceæ in a new aspect, but the Chroococcaceæ yet remains in a state of considerable confusion. The comparative neglect of this order by many algologists is clearly shown by the fact that in *The Freshwater Algæ of the United States*, by the late Rev. Francis Wolle, it occupies only eleven out of a total of 339 pages. An explanation of this may be forthcoming from the following passage quoted from his book. On p. 330 he says:—"It is now clearly evident that all of these so-called unicellular plants constitute nothing more or less than conditions in the plant-life of higher forms." I maintain that this statement is by no means proven. As is well known, those habitats in which Chroococcaceous plants mainly flourish are those which also furnish a prolific growth of many Nostoceæ, Scytonemaceæ, and Sirosiphoniaceæ; but, does the fact of their association together and their ability to live *only* under the same conditions of environment necessitate that they should be

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* *Mougeotia calcarea* Wittr. 'Om Gotl. och Ol. Sötv.-Alg.,' Bih. till K. Sv. Vet.-Akad. Handl. Bd. 1, no. 1, 40–42, t. ii.

† Wille in Warming, Haandbog i den Syst. Botan. 30.

‡ Huber, 'Sur l'*Aphanochæte repens* et sa réproduction sexuée,' Bull. Soc. Bot. Fr. tom. xli, Sess. extraord. p. xciv. t. vii.

§ A. W. Bennett & G. Murray, *A Handbook of Cryptogamic Botany*.

‖ Ann. des Sci. Nat. 1886–8, 7e série, iii.–vii.

¶ *L.c.* 1892, 7e série, xv.–xvi.

stages in the growth of some higher forms of Nostocaceæ? Is this a sufficient reason for Wolle's statement* that "all the forms of this family are probably mere conditions of development of higher forms"? Or for Itzigsohn's statement†—"I have observed these dimorphose *Chroococcus* cells associated with species of *Tolypothrix*, and believe that all the forms described as *Chroococcus* are nothing more or less than spores of Nostoceæ"? I have studied these plants in their native habitats for many years, at all seasons of the year and under a great variety of conditions of humidity, light, and temperature, and the answer I unhesitatingly give is—No: certainly not. Nor is it for me to comment here on the precipitation with which most of Wolle's observations were made, that having been done elsewhere,‡ but rather to indicate the difficulties which beset the investigator of this problem. The reproduction of the Nostoceæ, Scytonemaceæ, &c. by means of homogones is a fact which can be studied and confirmed even by the most casual observer, and the presence of spores other than homogones in *Hapalosiphon*,§ *Plectonema*,‖ and other genera, is not a very difficult matter to demonstrate. These spores may be in some cases "*Chroococcus*-like forms," but a critical examination will, as a rule, readily discriminate between the stages of the higher plants and the Chroococcaceous algæ with which they are intermingled. The difficulties in attempting to follow out the life-histories of these algæ are not merely due to the confused intermingling of various stages of plants belonging to many different genera, but also to the fact that these plants, if isolated for cultivation from the polymorphic matrix in which they occur, will, if they develop at all, often do so in an unnatural manner. This being so, may not some of those observations which have been put forward as a definite proof that the Chroococcaceæ are merely rudimentary stages (which pass through many generations before going on to the next stage) in the growth of higher plants, be based upon observations which in reality include stages of development of more than one species, or even more than one genus? However, be that as it may, when we find a plate of the very crudest drawings, including many genera which are at the present day accepted as valid, all intermingled in a confusion similar to that in which they naturally occur, and a ticket at the side stating that they are all forms of one plant,¶ is it to be accepted without a call for more evidence concerning the reproduction of these forms of plant-life?

---

* *Freshwater Algæ of the United States*, 324.

† Cfr. Wolle, *l. c.* 334, a translation of a passage in Itzigsohn's *Skizzen zu einer Lebensgeschichte des Hapalosiphon Braunii*, 1853.

‡ West & G. S. West, 'N. Amer. Desm.,' Trans. Linn. Soc. bot. 2 ser. v. 229.

§ Hansgirg in Oesterreich. Bot. Zeitschr. 1884, xxxiv. 393; West in Journ. Linn. Soc. bot. xxx. 272, pl. xv. f. 23–38; West & G. S. West in Journ. Bot. 1897, 241.

‖ In *Plectonema* peculiar rounded thick-walled cells of a yellowish colour are sometimes met with at or near the bases of the branches.

¶ Wolle, *l. c.* pl. clxxxiv. and pl. cxci.

The arrangement of the algæ in this paper is based upon a consideration of all the recent work at the group, and follows with few deviations that which is set down in the *Journal of the Royal Microscopical Society*, 1897, 467–511.* The few alterations consist in the elevation of the subfamily Conferveæ to the rank of a family —Confervaceæ—and the removal of the genus *Ophiocytium* from the family Palmellaceæ to the family Confervaceæ, reasons for which are given under the genus.

Much trouble has been taken to ensure that the nomenclature employed is as accurate as possible, and in the many instances in which synonyms have been given this has been rendered necessary owing to the inaccurate nomenclature of the latest British text-books on this subject.† The descriptions and figures in these compilations by Cooke are too imperfect and inaccurate to be of the real service they ought to be to a thorough student of this group of plants, and, in addition to this, the books do not contain more than half the known British species, including many of the most abundant.

All measurements are given in microns or μ (1 μ = ·001 mm.).

Summary of Genera and Species.

	GENERA.	SPECIES.	VARIETIES AND FORMS.
Florideæ.			
Chantransiaceæ	1	1	—
Chlorophyceæ.			
Confervoideæ Heterogamæ...	5	20	—
Siphoneæ	2	4	—
Confervoideæ Isogamæ	18	28	2
Conjugatæ	12	97	8
Protococcoideæ	28	62	3
Myxophyceæ.			
Hormogoneæ	14	39	—
Chroococcoideæ	12	21	—
Bacillarieæ	32	137	34
Total.....	124	409	47

Of this total of 409 species and 47 varieties, 35 species and 3 varieties have not previonsly been recorded for the British Isles, these being denoted by an asterisk (*) placed in front of them. There are also 9 species and 2 varieties which are here described for the first time.

The localities are arranged under the eight areas into which the county is divided by Babington in his *Flora of Cambridgeshire*. These areas are certainly convenient, but hardly natural, and have little or no significance with regard to the distribution of the algæ; they are as follows:—1. Cambridge; 2. Royston; 3. Wimpole;

* West & G. S. West, 'A Contrib. to the Freshw. Alg. of the S. of England.'

† M. C. Cooke, *British Freshwater Algæ*, 1882–4; also *British Desmids*, 1887.

4. Cottenham; 5. Burwell; 6. Ely; 7. Chatteris; 8. Wisbeach. The first two are the least productive, the Cambridge area being a particularly barren one.

The county is by no means well investigated; those Œdogoniaceæ and Zygnemaceæ which I have been unable to obtain in proper fruiting condition (and there are many of them) are not recorded, and there are whole districts, such as Wisbeach and Whittlesey, from which no collections have been made. Yet, notwithstanding these and other defects, I hope this paper will help to fill up one of those gaps in the alga-flora of England, the knowledge of which is essential before the singular distribution of these small plants can be adequately understood.

Class FLORIDEÆ.

Fam. Chantransiaceæ.

1. Chantransia chalybea (Lyngb.) Fries. 3. Sheep's Green, Cambridge: June, 1898; growing on *Amblystegium riparium* at the mill-race.

Class CHLOROPHYCEÆ.

Order Confervoideæ Heterogamæ.

Fam. Coleochætaceæ.

2. Coleochæte scutata Bréb. Generally epiphytic on aquatic phanerogamous plants, and probably abundant, though easily overlooked. 3. Hardwick; Wimpole Park. 6. Roswell Pits, Ely. 7. In ponds near March. 8. In ponds, Guyhirne, attached to *Vaucheria dichotoma*.

3. C. irregularis Pringsh. Rare. 5. Pools, Chippenham Fen, attached to the submerged stems of *Phragmites communis*. 8. In ponds, Guyhirne, attached to *Myriophyllum*.

4. Aphanochæte repens Berth. 3. Sheep's Green, Cambridge; Lord's Bridge. 5. Fordham. 6. Roswell Pits, Ely. The bristles of *Aphanochæte* Berth. are of a simple nature, sheathed at the base, and not septate; the chlorophyll masses are parietal.

*5. A. pilosissima Schmidle, 'Beiträge zur Algenfl. des Schwarzwalds und des Oberrheims,' *Hedwigia*, Bd. xxxvi. 1897, 5 (sep.), t. ii. fig. 1–3. Diam. cell. 19 μ; altit. circ. 9–10 μ. 3. Wimpole Park, attached to *Œdogonium* sp.

Fam. Œdogoniaceæ.

*6. Bulbochæte sessilis Wittr. 'Om Gotl. och Ol. Sötv.-Alg.,' Bih. till K. Sv. Vet.-Akad. Handl. Bd. 1, no. 1, 18, t. i. f. 2. Forms with large oogonia. 5. Wicken Fen: Aug. 1898. Crass. cell. veget. 19–23 μ; altit. 4-plo major; crass. oogon. 69–70 μ; altit. 59–63 μ; crass. nannandr. 11–13 μ; altit. 24–29 μ.

7. **B. ellipsospora**, sp. n. (Pl. 394, figs. 1, 2). Oogoniis magnis, depresso-globosis, sub setis terminalibus sitis; episporio lævi; dissepimento cellularum suffultoriarum in suprema parte harum sito; nannandribus bicellularibus in parte superiori oogoniarum sedentibus, multe breviori quam oogoniis, cellula basali (stipite)

paullo curvato. Crass. cell. veget. 19–21 μ; altit. 3–5-plo major; crass. oogon. 67–69 μ; altit. 59–61 μ; crass. nannandr. 10–13·5 μ; altit. 25–34 μ. 6. Roswell Pits, Ely; among *Utricularia vulgaris*, July, 1898.

Perhaps the nearest species to this are *B. borealis* Wittr. and *B. setigera* (Roth) Ag. From the former it is distinguished by its comparatively longer cells and much larger oogonia, and from the latter by its smaller cells, the form of the oogonia, the smooth oospores, and the position of the septum cutting off the supporting cells.

8. B. SUBSIMPLEX Wittr. 7. Ponds near March.

9. B. RECTANGULARIS Wittr. 5. Wicken Fen; Chippenham Fen.

10. ŒDOGONIUM CURVUM Pringsh. 3. Wimpole Park.

*11. Œ. FRAGILE Wittr. 7. Ponds S. of March. Crass. cell. veget. 12·5–14·5 μ; altit. 3½–5-plo major; crass. oogon. 44 μ; altit. 50 μ; crass. oospor. 40 μ; altit. 41 μ.

*12. Œ. PYRULUM Wittr. var. OBESUM Wittr. 2. Dernford Fen, 1 mile S. of Shelford. Crass. cell. veget. 12·5–13·5 μ; altit. 2½–4-plo major; crass. oogon. 34–35 μ; altit. 34·5–37 μ; crass. oospor. 28–30 μ; altit. 28–30 μ.

13. Œ. VERNALE (Hass.) Wittr. 2. Dernford Fen, 1 mile S. of Shelford.

14. Œ. VAUCHERII (Le Cl.) A. Br. 3. Wimpole Park.

15. Œ. OBLONGUM Wittr. Sheep's Green, Cambridge.

16. Œ. ROTHII (Le Cl.) Pringsh. 2. Dernford Fen, 1 mile S. of Shelford.

17. Œ. UNDULATUM (Bréb.) A. Br. *var. MOEBIUSII Schmidle (Süssw. Alg. aus Austral., *Flora*, 1896, Bd. 82, Heft 3, 297, t. ix. f. 1). 5. Chippenham Fen.

18. **Œ. crassipellitum**, sp. n. (Pl. 394, figs. 3–5). Œ. dioicum, nannandrium; oogoniis singulis (raro binis), subglobosis vel globoso-oboviformibus, poro superiore aperto; oosporis globosis vel subglobosis, pæne oogonia complentibus; membrana oosporarum maturarum crassissima glabraque; cellulis suffultoriis paullo tumidulis vel eadem forma ac cellulis vegetativis ceteris; nannandria longis et subrectis, in cellulis suffultoriis sedentibus, antheridio unicellulari. Crass. cell. veget. 31–36 μ; altit. 3–4-plo major; crass. oogon. 57–68 μ; altit. 61–77 μ; crass. oospor. 54–65 μ; altit. 54–71 μ; crass. nannandr. 13·5–17 μ; altit. 86–95 μ; crass. cell. antherid. 7·5–9·5 μ; altit. 13·5–16 μ; crass. membr. oospor. 5·5–7·5 μ. 8. Twenty-foot River, between March and Guyhirne; July, 1898.

This species seems to be quite characteristic, being the only diœcious nannandrous species having vegetative cells over 30 μ in thickness and at the same time globose oogonia; moreover, the mature oospores, which scarcely fill the oogonia, have a singularly thick wall, and are of a golden-brown colour. It is probably nearest *Œ. Hutchinsiæ* Wittr. (Cfr. Bœrgesen, 'Nogle Ferskv. alg. fra

Island,' Særtryk af Botanisk Tidsskr. Bd. 22, hft. 2, Kjobenhavn, 1898, 136, f. 2.)

19. Œ. Boscii (Le Cl.) Bréb. 3. Sheep's Green, Cambridge.

20. Œ. Landsboroughii (Hass.) Kütz. 2. Dernford Fen, 1 mile S. of Shelford.

Fam. Cylindrocapsaceæ.

*21. Cylindrocapsa geminella Wolle, var. minor Hansg. Very scarce. 3. Sheep's Green, Cambridge. 6. Roswell Pits, Ely. Crass. cell. veget. 15 μ. *Distrib.*—Bohemia and United States.

Order Siphoneæ.

Fam. Vaucheriaceæ.

22. Vaucheria sessilis (Vauch.) DC. 3. Sheep's Green, Cambridge; Orwell; Wimpole Park. 5. Chippenham Fen. 8. Guyhirne. In a gathering of this species from Sheep's Green, Cambridge, in July, 1898, some curious globular swellings were noticed at intervals in many of the filaments, frequently situated quite close to the oogonia, and generally giving rise to one or more branches of varying length, They were most probably "galls" produced by one of the Rotifera.

23. V. dichotoma (L.) Ag. 4. River Cam, between the "Pike and Eel" and Baitsbite. 5. Burwell Load. 8. In ponds, Guyhirne.

24. V. terrestris Lyngb. 2. Great Shelford, by the road-side. 6. Near Ely, on damp ground.

Fam. Hydrogastraceæ.

25. Botrydium granulatum (L.) Grev. 4. Abundant on mud in a drying ditch by the side of the Madingley Road, about 1 mile from Cambridge: Oct. 1898. 5. Between Swaffham Prior and the Beacon Course, Newmarket Heath, on drying-up chalk mud: July, 1895; *W. West, Jun.*

Order Confervoideæ Isogamæ.

Fam. Ulvaceæ.

26. Prasiola crispa (Lightf.) Ag. 1. Trumpington Street, Cambridge.

27. Enteromorpha intestinalis (L.) Link. This plant appears to be generally distributed in the rivers and drain-dykes throughout the county. 3. R. Cam, Sheep's Green. 4. R. Cam at Baitsbite. 5. Burwell Load. 6. R. Ouse, Ely; Sutton and Mepal, in ponds. 7. The Washes, Sutton; Old River Nene, March. 8. Guyhirne.

Fam. Ulotrichaceæ.

Subfam. Ulotricheæ.

28. Hormidium parietinum (Vauch.) Kütz. 1. Frequent about Cambridge. 5. Burwell. 7. March.

29. Hormiscia subtilis (Kütz.) De Toni. 5. Chippenham Fen.

Var. variabilis (Kütz.) Kirchn. Syn. *Ulothrix variabilis* Kütz. 1. Cambridge. 3. Coton; Wimpole Park.

30. H. TENUIS (Kütz.) De Toni. Syn. *Ulothrix tenuis* Kütz. 3. Wimpole Park.

31. H. MONILIFORMIS (Kütz.) Rabenh. 5. Chippenham Fen.

32. **Radiofilum flavescens,** sp. n. (Pl. 394, figs. 10, 11). R. cellulis submediocre, late et transverse ellipticis, cellulis conjunctis arcte in filis longis flexuosis; contentum chlorophyllosum cellularum cum pyrenoidibus singulis, luteo-viride deinde virideo-fuscescente. Long. cell. 5·5–8·5 μ; lat. cell. 7·5–10·5 μ.

5. Wicken Fen: Aug. 1898.

This species possesses a very distinct mucous envelope which exhibits a well marked radial striation, and the cells contain a parietal chlorophyll-plate with one pyrenoid, the remaining space being occupied by a yellowish fluid and a number of small granules. It is distinguished from *R. conjunctivum* Schmidle ('Aus der Chloroph.-Fl. der Torfstiche zu Virnheim,' *Flora*, 1894, Heft 1, 47, t. vii. f. 4, 5) by its elongated flexuose filaments, and its larger cells, which are broadly elliptical, as well as by the distinctive colour of the older plants. From *R. apiculatum* West & G. S. West in Journ. Bot. 1895, 52 (cfr. also Knut Bohlin, 'Die Alg. der erst. Regn. Expedit.,' Bih. till K. Sv. Vet.-Akad. Handl. Bd. 23, Afd. iii. no. 7, t. i. f. 7, 8), it is distinguished by its larger size, the form of its cells, which are not apiculate, and the colour of their contents.

Subfam. CHÆTOPHOREÆ.

33. HERPOSTEIRON REPENS (A. Br.) Wittr. Syn. *Aphanochæte repens* A. Br. non Berth. 2. Dernford Fen, 1 mile S. of Shelford. 3. Wimpole Park. 6. Roswell Pits, Ely, and ponds about Ely.

The bristles of *Herposteiron* Näg. are articular and very similar in nature to the piliferous apices of a *Chætophora*. Both this plant and *Aphanochæte repens* Berth. occur as epiphytes on larger algæ, especially on *Cladophora* and large species of *Edogonium*, and on *Lemna* (especially *L. trisulca*), *Elodea*, &c. Very fine specimens of *Herposteiron repens* (A. Br.) Wittr. were observed on *Elodea canadensis*, thickly covering both faces of the leaves, the procumbent branches of the alga in some cases closely following the contours of the cells of the *Elodea*, and for this reason exhibiting a marked reticular structure. In some of the examples hypnospores were present.

34. NORDSTEDTIA GLOBOSA (Nordst.) Borzi. 3. Hardwick.

35. CHÆTOPHORA PISIFORMIS (Roth) Ag. 1. In ditch, Trumpington. 3. Sheep's Green, Cambridge; Hardwick. 7. Near March.

36. C. CORNU DAMÆ (Roth) Ag. Syn. *C. endivæfolia* auct. 3. Sheep's Green, Cambridge; Hardwick.

37. C. ELEGANS (Roth) Ag. 6. Near Ely.

38. DRAPARNAUDIA PLUMOSA (Vauch.) Ag. 6. Roswell Pits, Ely.

39. STIGEOCLONIUM TENUE (Ag.) Rabenh. 3. Sheep's Green, Cambridge.

40. S. FASTIGIATUM Kütz. 3. Wimpole Park.

*41. Protoderma viride Kütz. 2. Dernford Fen, 1 mile S. of Shelford, on *Cladophora crispata*. 3. Sheep's Green, Cambridge, on *Elodea canadensis*. 5. Burwell Load, on *Glyceria fluitans*. 7. The Washes, Sutton, on *Glyceria fluitans*.

Although this plant is as yet unrecorded for the British Isles, I have no doubt that it is more or less generally distributed throughout the country, as I have met with it from several widely separated districts. It agrees well with Kützing's description, and also with the description and figures given by Borzi (*Studi Algologici*, Fasciolo ii. 245–287, t. xxi.–xxiv.). It occurs as an epiphyte on the leaves of many aquatic phanerogams, forming a closely adherent subparenchymatous stratum, which is generally fringed by filamentous outgrowths of unequal extent. These characters are also possessed by *Entocladia gracilis* Hansg. ('Ueber Entocladia Reinke und Pilinia Kütz.,' *Flora*, 1888, no. 33, t. xii. f. 6–15), a plant which was placed under the genus *Endoderma* by De Toni in *Notarisia*, iv. (1888), 673, and shortly afterwards referred by Hansgirg (in *Flora*, 1889, 58) to Kützing's genus *Periplegmatium* as *P. gracile* Hansg. Moreover, the cells of *Protoderma viride* and *Periplegmatium gracile* are of the same size, and, as the plants have the same habit, I think they may be justly regarded as forms of one and the same thing.

(To be continued.)

NEW SOMALI-LAND PLANTS.

The following are descriptions of some new species collected in Somali-land by Mrs. E. Lort Phillips and her friends in the winter of 1896–7 and presented to the British Museum.

Otomeria calycina Hiern. Suffrutex ramosus lucidus fere glaber, ramulis foliosis apicem versus subglutinosus foliis oppositis anguste ellipticis lanceolatisve utrinque angustatis firme chartaceis 3–11 cm. longis 1–3½ cm. latis margine integerrimis tenuissime revolutis venis lateralibus 4–6 utrinque notatis super saturate viridibus subtus glaucescentibus, petiolis 3–12 mm. longis, stipulis brevibus apice lobulis 1–3 lanceolatis præditis, cymis terminalibus brevibus paucifloris vel dense plurifloris corymboso-hemisphæricis, floribus 5–7 cm. longis breviter pedicellatis, calyce turbinato-campanulato longitudinaliter 10-costato 12 mm. longo, limbi 5-partiti lobis omnibus subfoliaceis paulum inæqualibus, basi intus cum corniculis parvis alternantibus, corollæ tubo elongato gracili faucem ovoideo-oblongam dense barbatam versus leviter dilatato, limbi lobis 5 subæqualibus ellipticis 8–9 mm. longis in æstivatione induplicatim valvatis, staminibus 5 faucis basi insertis inclusis, filamentis brevissimis, antheris dorso affixis linearibus 4 mm. longis bilocularibus nec reticulatim locellatis apice integris basi bifidis, polline globoso lævigato, disco parvo annulari-lobulato, ovario biloculari, stylo filiformi elongato exserto, stigmate bipartito,

segmentis brevibus incurvis, ovulis in loculis numerosis, capsulâ depresso-obovoideâ 6 mm. longâ, endocarpio corneo, seminibus numerosis.

Hab. Prope Dimoleh.

Otomeria rupestris Hiern. Fruticulus dichotome ramosus fere glaber, ramulis foliosis divaricatis, foliis oppositis patulis elliptico-lanceolatis utrinque angustatis chartaceis 2–3½ cm. longis 5–12 mm. latis margine integerrimo tenuiter revolutis venis lateralibus 3 vel 4 utrinque notatis super viridibus subtus pallidioribus, petiolis 1·5–3 mm. longis, stipulis brevibus apice dentibus 1–3 præditis, floribus solitariis vel in cymis paucifloris terminalibus abbreviatis dispositis subsessilibus 2 cm. longis, calyce 5–6 mm. longo, tubo 1·5–2 mm. longo turbinato-campanulato subanguloso costato, limbi partiti lobis 5 vel 4 inæqualibus nonnullis subfoliaceis intus glandulis parvis interpositis, corollæ lilacinæ tubo elongato faucem infundibuliformi-oblongam barbatam versus leviter dilatato, limbi lobis 5 subæqualibus ovatis 3 mm. longis, staminibus 5 faucis basi insertis inclusis, filamentis brevibus, antheris linearioblongis dorso affixis 2 mm. longis bilocularibus nec reticulatim locellatis apice integris basi emarginatis, stylo exserto apice bilobo, lobis linearibus apice incurvis.

Hab. Prope Wagga ad 1890 m. alt. supra rupes nudas repens.

Oldenlandia fasciculata Hiern. Stirps ramosa, ut videtur perennis; ramis tenacibus, tenuiusculis, fere glabris, infra sublignosis, super herbaceis; foliis patentibus oppositis cum cæteris paribus in axillis additis fasciculatis, sublinearibus, apice plus minusve acutatis basi cuneatis sessilibus hispidulo-scabridis 6–25 mm. longis, marginibus lateralibus sæpius revolutis; stipulis connatis vaginantibus brevibus truncatis in dentibus apicalibus subulatis parvis deciduis desinentibus; floribus axillaribus, patulis, tetrameris, solitariis, subsessilibus, folia excedentibus, 24–36 mm. longis; pedunculo florifero brevissimo; calyce 4 mm. longo, tubo infundibuliformi-obvoideo extus hispidulo, lobis 2½ mm. longis æqualibus erectis persistentibus lanceolato-subulatis acutis breviter ciliatis; corollâ graciliter tubulosâ, tubo 20–30 mm. longo extus minute puberulo, fauce infundibuliformi nudâ, lobis lanceolatis obtusiusculis patulis 4 mm. longis; staminibus 4, antheris oblongis, sessilibus, 2 mm. longis ad faucem insertis inclusis; stylo breviter exserto glabro; capsulis nonnunquam pedunculatis (pedunculo 8 mm. longo), cum sepalis persistentibus 5 mm. longis, hispidulis.

Hab. Ad monte Wagga.

Affinis *O. longitubæ* Ritter v. Beck in Paulitschke, Harar, p. 461, fig. 2 (1888), differt foliis magis fasciculatis brevioribus et corollæ lobis longioribus lanceolatis.

Oldenlandia (*Kohautia*) Schimperi T. Anders. var. somalense Baker fil. Caulis erectus ramosus, foliis linearibus sessilibus quam iis *O. Schimperi* Anders. inferne minus fasciculatis et floribus capsulisque majoribus.

Hab. Wagga Mountain.

An erect branching annual about 30 cm. high, branches pube-

rulous or subscabrid. Leaves linear, pointed, sessile, 2·5–3 cm. long, the uppermost smaller, margins revolute, stipules shortly connecting the leaf-bases, cuspidate. Flowers tetramerous, apparently purple, pedicellate in few-flowered cymes, pedicels 1 mm.–1 cm. or sometimes longer. Calyx ± 4 mm. long, very shortly hairy, lobes lanceolate-acuminate. Corolla-lobes of larger flowers about 6 mm. long, tube 8–9 mm. long. Stamens and style included. Capsule 3 mm. long.

Differs from *O. Schimperi* T. Anders. by its larger flowers and capsules. Leaves not so inclined to be fasciculate below. The flowers vary somewhat in size, the measurements given are applicable to the larger specimens examined, and are considerably in excess of those of typical *O. Schimperi;* even the smaller flowers are rather bigger than those in the type of this latter plant. It differs from *O. obtusiloba* Hiern by having larger capsules and larger corolla-lobes.

Helichrysum somalense Baker fil. Nanum fruticosum divaricatim et copiose ramosum; foliis sessilibus lanceolatis acutis utrinque cinereo-tomentosis; capitulis parvulis teretibus pauciforis corymbum densum terminalem capituliformem constituentibus, involucri foliolis imbricatis aureis scariosis oblongis vel ovato-oblougis subacutis, floribus femineis ± 3 hermaphroditis centralibus sæpissime 5 vel 6; carpellis papillosis; pappi setis barbellatis.

Hab. Upper Sheik. "Flowers yellow."

Dwarf, fruticose, root descending, 10 cm. long; divaricately and copiously branched, branches more or less cinereous-tomentose. Leaves sessile, lanceolate, often about 7–8 mm. long. Capitula small, terete, congested at the ends of the branches (often about 5–8 capitula together). Bracts of involucre imbricate, pauciseriate, varying in shape according to position, oblong or oblong-ovate; apex subacute or almost obtuse, scariose, varying somewhat in length, often about 2·5–3 mm., and about 1 mm. broad, of a shining deep straw-colour. Female florets frequently 3. Hermaphrodite florets 5 or 6.

Allied to *H. cymosum* Less., and *H. Lastii* Engler, Hochgebirgsflora, p. 430 (1892).

Dicoma (§ Eu-Dicoma) **somalense** S. Moore. Fruticosa, erecta, intricate ramosa, ramulis strictis sparsim foliosis sursum nudis obtuse quadrangularibus minutissime albido-pruinoso-tomentosis deinde glabris, foliis parvis sessilibus anguste linearibus breviter apiculatis margine revolutis subtus cano-tomentellis, capitulis mediocribus vel parvis, involucri late campanulati phyllis multiseriatis exterioribus recurvis lanceolatis vel ovato-lanceolatis spinoso-acuminatis; pappi duplicis setis breviter barbellatis interioribus basi amplificatis exteriores æquantibus.

Hab. Wagga Mountain, and tops of hills above the Upper Sheik.

Rami 0·3–0·5 cm. diam., cortice cinereo hac atque illac rimoso obducti. Ramuli 0·1–0·23 cm. diam., glandulis minutissimis im-

mersis crebro induti. Folia 0·5–2·0 cm. long., 0·1–0·15 cm. lat., summa sparsa et gradatim miniata, nonnulla usque ad 0·2 cm. reducta, erecta vel patula, ima basi ampliata, costa media subtus eminente percursa. Capitula circa 1·3 cm. long., 1·3–2·0 cm. lat., pallide straminea; phylla extima 0·2–0·4 cm. long.; media circa 1·2 cm. long., deorsum 0·2 cm. lat.; summa latiora et lineis duabus interruptis brunneo-rubris notata. Flores albi. Styli rami elongati. Achænia obscure costata, more generis basi dense villosa, 0·2 cm. long., 0·15 cm. lat. Pappus 0·8 cm. long., albus.

A very distinct species, with heads somewhat like those of *D. tomentosum* Cass. The densely branched habit, small leaves, and heads set on the top of the branchlets some distance above the uppermost leaves, are points by which this species can easily be distinguished among North-African ones.

The style-arms of *Dicoma* are usually described as "very short," and this, at least in the case of specimens examined by me, is a mistake. The organs in question are elongated and thong-like, and, except at the tip, very closely adpressed,—so closely, indeed, that it requires a little patience to separate them, though in all probability they come asunder spontaneously at an advanced stage of flowering. What I mean will be readily understood on reference to Fitch's excellent figure of *D. karaguensis* Oliv. in *Trans. Linn. Soc.* vol. xxix. t. 70. I have no doubt that the whole of what looks like the swollen upper part of the style in fig. 4 of that tab. is really the appressed style-arms, the style of species examined by me having had exactly the same appearance until separation of the two arms had been effected.

Lasiostelma somalense Schlechter. Ramis virgatis, teretiusculis, glabris, aphyllis, squamulis tantum minutis acuminatis hinc inde obsessis; racemo elongato laxe plurifloro; floribus illis *L. Gerrardi* Schltr. (*Brachystelmaria Gerrardi* Schlecht.) paulo minoribus geminis in axillis squamorum, graciliter pedicellatis; pedicellis filiformibus glabris, flori fere æquilongis; calycis segmentis lanceolatis acutis glabris, erecto-patentibus, corollæ tubo æquilongis, 0·4 cm. longis; corolla campanulata 1·5 cm. longa, alte fissa, tubo cupuliformi hemisphærico, segmentis erecto-patentibus ligulato-spathulatis, conspicue apiculatis, extus glabris, intus marginibus pilis fuscato-purpureis dense barbatis; corona cupuliformi, segmentis 5 exterioribus bifidis, foliolis 5 interioribus ligulatis obtusis foliola exteriora duplo fere excedentibus, glaberrimis.

In terra Somalorum, loco speciali haud indicato.

The genus *Lasiostelma* was founded by Bentham in the Gen. Pl. and placed by him into the tribe *Marsdenieæ*, and the first species was published by Oliver in *Icones Plantarum*, t. 1449.

In 1893 a plant was sent to me by Mr. J. M. Wood in Natal, which I found to be a genus of *Ceropegieæ* and published it as *Brachystelmaria*, not thinking that Bentham could have made the mistake of placing it in *Marsdenieæ*. After consulting the type in Kew during my last visit there of *Lasiostelma Sandersoni*, I saw to my great surprise that it was my *Brachystelmaria*.

The genus *Lasiostelma* contains seven species—*viz.* *L. Sandersoni* Oliv. (*Brachystelmaria natalensis* Schlecht.), *L. Gerrardi* (*B. Gerrardi* Schlecht.), *L. longifolium* (*B. longifolia* Schlecht.), *L. macropetalum* (*B. macropetalum* Schlecht.), *L. ramosissimum* (*B. ramosissimum* Schlecht.), *L. somalense*, and *L. subaphyllum* (*Brachystelma subaphyllum* K. Sch.).

As to its affinity, our plant resembles most in habit *L. subaphyllum*, also from Somali-land; but it is very different in the shape of the petals and the structure of the corona. The colour of the flowers in the specimen at hand is pale brown with dark reddish spots, dark purple inside.

Pterodiscus saccatus S. Moore. Subsucculenta, pusilla, minute lepidoto-pruinosa, caulibus abbreviatis simplicibus, foliis approximatis ascendentibus subsessilibus lineari-lanceolatis margine undulatis raro denticulatis, pedicellis calyci subæquilongis, calycis lobis lanceolatis breviter acuminatis, corollæ mediocris tubo satis angusto postice breviter sed distincte saccato deorsum coartato sursum cylindrico limbi lobis abbreviatis late rotundatis margine crispis anticis posticos paullo excedentibus, staminum longiorum filamentis corollæ tubum fere semiæquantibus, ovario ovoideo-oblongo, stylo crasso stamina excedente, lobis stigmaticis ellipticis.

Hab. Wagga Mountain.

Rhizoma deest. Exemplum unicum a nobis visum circa 3·0 cm. alt. Caules in sicco angulati, 0·13–0·2 cm. diam. Foliorum laminæ 1·0–1·7 cm. long., 0·2–0·25 cm. lat., apice plerumque curvatæ, basi in petiolum alatum perbrevem desinentes. Pedunculi basi 2-glandulosi, 0·15 cm. long. Calyx 0·25 cm. et lobi ejus 0·2 cm. long. Corollæ purpureo-aurantiaceæ? tubus vix 2·5 cm. long., deorsum 0·2 cm. diam., sursum gradatim usque ad 0·5 cm. amplificatus, ipso sub limbo ad 0·4 cm. miniatus; saccus obtusus 0·13 cm. long.; limbi lobi antici 0·25 cm. long., circa 0·4 cm. lat. Discus posticus ovario semiæquilongus. Staminum longiorum filamenta 1·1 cm. long.; antheræ omnes 0·23 cm. long. Staminodium 0·3 cm. long., sursum discolor. Ovarium 0·2 cm. et stylus 1·5 cm. long.; lobi stigmatici 0·15 cm. long. De fructibus inquirendum.

This has much the look of very diminutive forms of *P. speciosus*, but it is entirely different from that plant, *e. g.* in its saccate corollas with much narrower and, indeed, altogether diversely shaped tube, and dissimilar limb. Judging from the description, *P. angustifolius* Engl. has some points of resemblance to the new spocies, from which, however, among other points, its very slender corolla serves at once as a distinguishing feature. The well-developed sac of *P. saccatus* is a noteworthy character.

Pterodiscus undulatus Baker fil. Caulis basi incrassatus succulentus simplices vel ramosus; foliis superne approximatis inferne remotis erecto-patentibus viridibus oblongo-ovatis vel ovatis vel ellipticis utrinque plus minusve lepidotis in petiolum longiusculum basin versus angustatis margine undulatis vel obtuse dentatis; pedicellis brevibus quam calycem vix longioribus; sepalis

lanceolatis, corolla externe lepidota quam sepalis ± 9-plo longiore, antheræ loculis triangularibus, filamentis basin versus hirsutis, stylo tenui filiformi ultra stamina exserta, fructus alatus.

Hab. Wagga Mountain.

Perennial, branches succulent somewhat lepidote, those in the specimen seen 14–18 cm. long. Leaves oblong-ovate, ovate or subelliptical, narrowing gradually to the petiole; lamina $2\frac{1}{2}$ to nearly 4 cm. long, 1·3 to nearly 2 cm. broad, lepidote below, less lepidote above, margin remotely and grossly crenate-dentate, undulate; petioles ± 1·2 cm. long, lower internodes often about 2 cm., upper internodes much shorter. Flowers borne on pedicels ± 2 mm. long. Calyx 1·5–2 mm. long, sepals lanceolate, pedicels and lower part of calyx ± covered with lepidote scales. Corolla trumpet-shaped, about 1·6 cm. long, more or less lepidote externally. Fruit winged, 1·5 cm. long, a little broader than long.

Hæmacanthus S. Moore. Acanthacearum e tribu Ruelliearum genus novum. Calyx tubulosus, oblongus, 5-angulatus, apice 5-lobus haud contractus. Corollæ tubus cylindraceus, superne leviter ampliatus, nequaquam ventricosus; limbi lobi 5, subæquales, æstivatione contorta? Stamina 4, æquilonga; filamenta per paria lateralia deorsum dilatata et longe connata infra medium tubum affixa, longe exserta; antheræ oblongæ, loculis æqualibus, parallelis, muticis; pollinis grana sphæroidea, faviformi-insculpta et revera iis *Satanocrateris* similia. Discus inconspicuus. Stylus longe exsertus; stigmatis lobus posticus obsoletus; ovula quove in loculo 2.— Suffrutex humilis? Folia parva, integerrima. Flores majusculi, axillares, solitarii, parvibracteolati.

H. coccineus S. Moore. Foliis oblongis vel oblanceolatis obtusissimis minute lepidotis petiolis circa 0·2 cm. long. albo-tomentosis fultis, pedunculis foliis brevioribus juxta medium bracteolatis, calyce fere glabro eminenter 5-nervoso nervulis transversis crebro percurso, corollæ calycem fere duplo excedentis vivide coccineæ tubo extus hirsuto-pubescente limbi lobis amplis obcordatis, ovario oblongo, stylo calycem fere 3-plo excedente.

Hab. Somali-land.

Fragmenti tantum mihi obvii ramuli subteretes, 0·12–0·15 cm. diam., cinerei, minute puberuli vel pubescentes. Folia 0·8–1·2 cm. long., 2·5–4·0 cm. lat. Pedunculi 0·5 cm. long., ascendentes. Bracteolæ lineari-subulatæ, puberulæ, 0·3 cm. long. Calyx in toto 1·4 cm. long., basi 0·4 sursum 0·5 cm. lat., integer obtuse 5-angulatus, sed in segmentis 5 faciliter et verisimiliter interdum naturaliter divisus; lobi calycis integri triangulari-deltoidei, acuti, 0·2 cm. long., margine breviter gossypini. Corollæ tubus deorsum angulatus, fere usque 2·5 cm. long., 0·25 cm. diam., sursum gradatim usque ad 0·6–0·7 cm. amplificatus; limbi 3·0 cm. diam., lobi vix 1·5 cm. long., glabri. Filamenta ad 0·6 cm. supra basin tubi inserta, 3·5 cm. long., dimidio inferiore per paria connata; antheræ 0·35 cm. long. Ovarium sursum leviter attenuatum, pubescens, 0·6 cm. long; stylus fere glaber, 4·0 cm. long.; stigmatis lobus evolutus 0·3 cm. long., filiformis. Capsula?

The affinity of this singular plant is doubtless with the Abyssinian *Satanocrater* Schweinf. The short lobes of its transversely-nerved angular calyx seem at once to indicate its probable position in the order; but the calyx is not ventricose, and the lobes are easily separable, *e. g.* when placed in boiling water. The corolla with its narrow tube and deeply divided limb, and the exserted stamens and style are quite different from those of Schweinfurth's genus. Moreover, the pairs of filaments of *Satanocrater* are stated in the *Genera Plantarum* to be approximate merely; and, if this account be correct, the union of the pairs for half their length which one finds in the case of *Hæmacanthus* is another distinguishing feature. I have not, however, been able to examine a flower of *Satanocrater*, owing to the small amount of material in the Museum, and it is quite possible to conceive Mr. Bentham's statement as implying union of the pairs of filaments. The pollen is exactly like that of the older genus as figured by Lindau (Bot. Jahrb. Bd. xviii. p. 40), except for the figure in question showing three pores, which seems to imply that they are equatorial, whereas I could never see more than one pore at a time.

Coleus cuneatus Baker fil. Caulis erectus, lignosus, dense rufo- vel fulvo-pubescens; foliis breviter petiolatis, cuneatis vel cuneato-ovatis, marginibus apicem versus serratis vel crenato-serratis, basin versus integris, coriaceis, subtus minute bullulatis; verticillastris inferioribus ± 2 cm. distantibus, simplicibus, pedicellis pubescentibus quam calyce florifero longioribus; calyce extus hirto intus glabro, calyce fructifero dente supremo ovato acuto reliquiis triangularibus acuminatis; corollæ tubo quam calyci florifero longiore, labio superiori recurvato, inferiore magno naviculari, staminibus labio inferiori æquilongis vel longioribus.

Hab. Wagga Mt.

Leaves thick cuneate, serrate or crenato-serrate at the apex, lamina longer than the petiole, below minutely bullulate, lamina with petiole 1·5–3·5 cm. long, when leaves fall conspicuous scars are left. Verticillasters simple, lower about 2 cm. apart, upper closer. Sepals unequal, uppermost ovate, acute, rest triangular acuminate. Calyx-tube ribbed after flowering. Corolla-tube abruptly bent 3 mm. from base, longer than calyx, upper lip sharply reflexed, lower lip much longer, boat-shaped (lower lip about 1 cm. long). Corolla hairy externally. Stamens longer than corolla.

Coleus speciosus Baker fil. Herbaceus perennis, caulibus albohirtis; foliis oblongis vel ovato-oblongis in petiolum sensim attenuatis, margine serratis vel crenato-serratis utrinque hirtis, lamina quam petiolo longiore, verticillastris simplicibus ± 6-floris laxis, pedicello glanduloso-hirto sæpissime quam calyce longiore, bracteis ovatis; calycis tubo campanulato dentibus inæqualibus supremo ovato acuminato reliquiis lanceolatis acuminatis, corollæ tubo quam calyci florifero longiore, labio superiori reflexo lobato, inferiori magno oblongo-naviculari; staminibus quam labio inferiori brevioribus.

Hab. Wagga Mountain.

Noticeable on account of its showy flowers. Belongs to the section *Calceolus*.

Perennial, stems covered with white hairs. Leaves oblong or ovate-oblong, margin serrate or crenate-serrate, base narrowing gradually to petiole, hairy on both surfaces, lamina longer than the petiole. Leaf including petiole 6–7 cm. long. Racemes elongate, lower verticillasters 4–5 cm. apart, upper closer; pedicels hairy, not branched, 6 mm. to nearly 1 cm. long. Verticillasters often about 6-flowered. Calyx externally hairy, villous internally, uppermost sepal ovate-acuminate, lower sepals lanceolate-acuminate. Fruiting calyx 8–9 mm. long. Corolla-tube sharply bent about 3 mm. from base, longer than the sepals, upper lip reflexed, lobed, lower lobe much longer, boat-shaped. Corolla ± 2·3 cm. long, in dried specimen purple. Stamens shorter than lower lip, style slightly longer than stamens. Seeds brown, shining.

Allied to *C. Penzigii* Baker in Gard. Chron. 1893, ii. p. 616, and *C. vestitus* Baker in Kew *Bulletin*, 1895, p. 224.

Otostegia modesta S. Moore. Humilis? sparsim necnon debiliter spinosa, ramulis patentibus crebro foliosis, foliis parvis petiolatis ovatis vel ovato-subrhombeis obtusissimis crenatis vel crenato-dentatis supra minute pubescentibus mox puberulis subtus arcte incano-tomentosis, floribus in axillis solitariis, calycis pubescentis tubo attenuato eminenter nervoso labio postico perbrevi tridentato dentibus late triangularibus labio antico undulato, corollæ calycem fere duplo excedentis tubo attenuato.

Hab. Wagga Mountain.

Caules exempll. duorum parvulorum mihi solummodo obviorum sat tenues, in longitudinem rimoso-striati, pallide brunnei, arcte tomentosi dein glabri. Foliorum laminæ 0·7–1·3 cm. long., 0·6–1·0 cm. lat., basi leviter attenuatæ, subtus eminenter nervosæ, petiolis 0·3–0·5 cm. long. fultæ. Bracteæ nunc spinosæ nunc nequaquam induratæ, tenuissimæ, usque ad 0·4 cm. long. Calycis in sicco subsmaragdini tubus basi attenuatus, 0·7 cm. long., 0·2–0·3 cm. diam.; labium posticum vix 0·3 cm. long.; ejus dentes basi 0·3 cm. lat., apice obtusi; labium anticum circa 0·5 cm. long.; calycis limbus totus 1·0 cm. diam. Corollæ tubus calyci æquilongus vel revera eum paullo excedens, 0·25 cm. diam.; labia æquilonga; labii antici lobi laterales ovati, integri; lobus medianus laterales longe excedens, reniformi-obcordatus, 0·35 cm. long. Stylus 1·5 cm., et stigmatis lobi 0·1 cm. long.

Near *O. repanda* Bth. and *O. arabica* Jaub. & Spach. To be distinguished from small-leaved forms of *O. repanda* by the leaves soon becoming glabrous above while they remain hoary beneath; by the solitary flowers—though this may eventually be found to be no absolute character; and by the longer and slenderer calyx-tube and different calyx-limb. *O. arabica*, according to the excellent analysis of Jaubert & Spach. (*Illust. Pl. Orient.* t. 380), besides its somewhat differently shaped leaves, has not spiny bracts, its calyx is quite different, and the side-lobes of the lower lip of its corolla are broader and retuse at the apex.

Chloris somalensis Rendle Gramen gracile, elatum, foliis glauco-viridibus, anguste lineari-lanceolatis, longe acuminatis, vel lineari-acuminatis, ligula subobsoleta, scariosa, fimbriata; spicis quaternis, confertis, tripollicaribus, angustis, densis, atro-viridibus, spiculis lanceolatis, bilinealibus, unifloris; glumis vacuis valde inæqualibus, exteriore minore, nervo excepto hyalina, acute-lanceolata, interiore spiculam æquante, oblongo-lanceolata, acuta, carina scabridula; gluma fertili, quum aperta est, ovata, nervis marginalibus superne ciliolatis exceptis glabra, ex apice vix bilobulato aristata, arista glumam duplo excedente, palea vix breviore, ovali, viridi, glabra; gluma superiore ad rudimentum pedicellatum, aristatum, reducta.

An elegant plant, apparently perennial and cæspitose, glabrous, erect, slender, the single culm including the inflorescence 3 ft. high, sheathed at the base by distichous flattened glabrous leaf-sheaths about 3 in. long; cauline internodes 5, terete and smooth, the lowest only $\frac{3}{4}$ line in diameter, except the lowest increasingly longer than the loose submembranous leaf-sheaths; basal leaf-blades reaching 9 in. long, $2\frac{1}{2}$ lines broad, often plicate on the conspicuous midrib, or convolute, apex subaristate; cauline leaves shorter, base of the blade sometimes sparsely pilose on the upper face. Edges of subflattened green rachis scabridulous, spike $\frac{2}{3}$ to scarcely 1 line wide, outer barren glume 1 line long, inner $1\frac{3}{4}$–2 lines, fertile glume $1\frac{1}{2}$ line, awn 3 lines, straight or slightly bent at the base, pedicel of upper aborted glume slender, glabrous, $\frac{3}{4}$ line long, glume-rudiment $\frac{1}{4}$ line, awn nearly 1 line.

A well-marked species, perhaps nearest to *C. radiata* Sw., but distinguished by habit, single-flowered spikelet, glabrous flowering glume, &c.

Hab. Wagga Mountain.

NOTES ON SAXIFRAGA.

By James Britten, F.L.S.

The following notes have been made during a revision of the Saxifrages in the National Herbarium. They are mainly based upon the types of David Don's Monograph in Trans. Linn. Soc. xiii. 341–452 (1822), from the collection of Pallas, which was formerly in Lambert's Herbarium, and was bought for the Museum at his sale in 1842, at the cost of £49. To these I have added such other matters of interest as came in my way, including certain corrections of Mr. Jackson's invaluable *Index Kewensis*, with a few additions thereto, indicated by a prefixed asterisk.

**S. adjugifolia* Haw. Misc. Nat. 163 (sphalm.) = ajugifolia.

**S. adscendens* Pav. ex D. Don, *l. c.* 420 = cuneifolia.

S. aizoides L. Sp. Pl. 403. I observe that Dr. Britton and his school retain this name, but if the neo-American rule of priority of

place is to be enforced, it must surely yield to *S. autumnalis* L. *l. c.* 402?

S. androsacea Pursh, Fl. Amer. Sept. 310 ("Nelson in Herb. Banks") certainly = *S. Hirculus*, although Pursh describes the flowers as white. It is given as "= cæspitosa?" in Ind. Kew.

S. angustifolia Haworth, Misc. Nat. 166, is, as is generally understood, a form of *S. hypnoides*, to which, indeed, Haworth later (Saxifr. Enum. 33) referred it. He says: "I gathered this species on a mountain in Westmoreland in the year 1795. My friend Mr. Dixon† has also found it growing spontaneously there; and informs me it is the *S. angustifolia* of the Banksian Herbarium, which name I have therefore adopted." The Banksian specimen, which is described in Solander's MSS., came from Kew Gardens in 1774.

S. angustifida Hort. should stand as "ex D. Don in Trans. Linn. Soc. xiii. 450."

S. BRACTEATA D. Don, *l. c.* 367. I do not find this apparently very distinct species in Engler's monograph, although it is duly recognized by Seringe (in DC. Prodr. iv. 37), who follows Don in placing it near *cernua* and *rivularis*. The type-sheet from Herb. Lambert contains many excellent specimens.

S. bryoides? Pall. ex D. Don, *l. c.* 382 = bronchialis (not nitida as in Ind. Kew.).

S. ceratophylla Dryand. in Hort. Kew. ed. 2, iii. p. 70. I do not find Dryander's types in Herb. Banks, nor his MS. description. The two sheets from Pavon, on which D. Don based his description of *S. ceratophylla*, are now in Herb. Brit. Mus.

S. CORDIFOLIA Haw. is generally recognized as very distinct from *S. crassifolia*, to which it is referred in Ind. Kew.

**S. davurica* Hort. ex D. Don, *l. c.* 354 = cuneifolia.

S. diversifolia, *S. microphylla*, and *S. protensa* Schleich. Cat. Pl. Helv. ed. iv. 63. I do not understand on what principle these names are selected from others which stand on precisely the same footing for inclusion in the Kew Index. At the end of Schleicher's Catalogue—a mere list of names—is an "appendix plantarum exoticarum," consisting of a number of names under *Saxifraga* and *Aconitum*, attributed to various authors under abbreviations which, in at least one instance—"Angz."‡—have an unfamiliar aspect. Of the three names I have cited, the first two are localized in the Index "Eur. centr.," and the third is given as from "Helvet."; but as absolutely nothing beyond the name is known about the plants, this localization must be pure guesswork. All who use the Index know that the geographical distribution is its weakest side. It is, I think, much to be

† "Mr. J. Dixon, of Clapham, an assiduous and successful cultivator of Saxifragæ."—Haw. Syn. Pl. Succ. 325.

‡ I have a suspicion that this means "Anglorum," but this is mere conjecture.

regretted that in such cases as this the word "nomen" should not have been added after the name, which I also think should have been placed in italics; appearing, as these do, as if known and retained species, they must cause much trouble to monographers who have not access to a library in which such lists are to be found. I purposely refrain from citing certain other names which are not taken up in the Index, for it seems worse than useless to burden literature with such encumbrances. It would appear that such of the names in Schleicher's list as were capable of identification are taken up by Seringe (in DC. Prodr.), who cites them with a mark of certainty; the rest need not be resuscitated.

S. ELEGANS Nutt. in Torr. & Gray, Fl. N. Amer. i. 573 (1840) and in Herb.! (in Mus. Brit.) is omitted from Engler's monograph.

S. elegans Mackay should stand as "ex D. Don in Trans. Linn. Soc. xiii. 350."

S. flabellifolia Br. Brown contributed the description of this plant to Fl. N. Amer. i. 569; it is not mentioned in his collected works.

*S. GILLII Trimen in Gill's 'River of Golden Sand,' ii. 426 (1880) (nomen), and in Herb. Mus. Brit.; Bretschneider, Hist. Eur. Bot. Disc. China, 735. This is, as Dr. Bretschneider supposes, the "Saxifraga species nova?" of the Index Fl. Sinensis, i. 269. Mr. Hemsley (*l. c.*) says: "This is very distinct from any other Chinese species that we have seen, and apparently equally so from the new species described by Engler which we have seen"; he diagnoses it: "Folia desunt; scapus gracilis, nudus, glaber, pauciflorus, floribus rubris." It was collected on Ra-ma-la mountain, 14 Aug. 1877.

S. GRANULATA L. The following note of the occurrence in a wild state of the double-flowered form seems worth transcribing:—"[This] was found wild by Mr. Joseph Blind, gardener at Barns, who transplanted it into his garden, and afterwards distributed it to several curious persons; since which time it hath been multiplied so much, as to become a very common plant in most gardens near London, where it is commonly planted in pots, to adorn court-yards, &c. in the Spring."—Miller, Gard. Dict. ed. i. (1731).

S. incurva Mackay should stand as "ex D. Don in Trans. Linn. Soc. xiii. 423."

S. intermedia Sweet, Hort. Brit. ed. i. 181. This name, retained in Ind. Kew., results from the transference by Sweet of Haworth's *Chondrosea intermedia*, which Haworth (Saxifr. Enum. 11) thought was probably a hybrid between *S. pyramidalis* and *S. longifolia*.

*S. *juniperina* Bieb. Fl. Taur.-Cauc. i. 314 (1808) = juniperifolia.

S. lanceolata Haw. Syn. Pl. Succ. 324. This is an obscure plant, and may be a form of *hypnoides*. Localized as "Eur. austr." in Ind. Kew., but Haworth, *l. c.* says: "I had this plant from Mr. J. Donn as a Scotch species."

S. latifida. The two references placed together under this name in *Index Kewensis* indicate two very different plants. The *latifida* of Haworth—"a Scotch plant"—(Syn. Pl. Succ. 325) =, as stated by Mr. Jackson, *S. hypnoides*. *S. latifida* D. Don in Trans. Linn. Soc. xiii. 420, founded on a Spanish plant from Pavon in Lambert's Herbarium (now in the British Museum), was subsequently referred by D. Don (in Herb.) to *S. cuneifolia* Cav. (*S. cuneata* Willd.), with the figure of which it agrees very well; it has nothing to do with *S. decipiens* Ehrh., under which it is placed by Engler. Don's name is not taken up by Willkomm & Lange in Prodr. Fl. Hisp.

**S. ligulata* Haw. Misc. Nat. 159 (sphalm. ?) = lingulata.

**S. marilandica* Hort. ex D. Don, *l. c.* 385 = *S. marylandica*, for which the page in Sternberg should stand as "iv," not "4."

S. MEDIA Gouan. This is properly retained in Ind. Kew., but *S. media* Sibth. & Smith, Fl. Græca, t. 376 (1823) (which should stand as Sm. Fl. Græc. Prodr. 275 (1806)) is given as if another plant, and referred to *S. porophylla* Bertol. On turning to this last we find it in italics, but referred to no other species. The name for all is *S. media* Gouan, Illustr. 27 (1773).

**S. nivalis* Herb. Banks ex D. Don, *l. c.* 383 = hieracifolia.

S. nutans D. Don certainly = *Romanzoffia unalaschcensis* only, not *R. sitchensis*, to which it is also referred in Ind. Kew.

S. obtusifolia D. Don, *l. c.* 416. This name is kept up in *Index Kewensis* and omitted by Engler. On the type-sheet Don has crossed out his note, "*S. pentadactylae* Lapeyr. valde affinis sed abunde differe censeo"; and has substituted "*S. pentadactyla* Lapeyr. si non sit eadem certè nimis affinis." His later opinion is, I think, clearly correct.

**S. pentadactyla* D. Don, *l. c.* 419. I do not find in Herb. Banks the specimen from La Peyrouse cited by Don. This form of the name *pentadactylis*, adopted "on the suggestion of Sir J. E. Smith," is not in the *Index Kewensis*.

S. petiolaris should stand as "R. Br. in Ross Voy. cxlii. (1819) (nomen); Chlor. Melvill. cclxxiv. (1823)." The other names cited by Mr. Jackson from ed. 2 of Ross's Voyage will all be found in ed. 1.

S. pilosa Haw. *S. virginiensis* Mich. ad *S. pilosa* Haw. were published independently in the same year (1803), the latter name, as appears from Bot. Mag. sub t. 1664, being taken from Solander's MSS. in Herb. Banks. Haworth's preface is dated July, so probably Michaux's name is entitled to the precedence accorded to it. Haworth (Saxifr. Enum. 8) says "in Scotia montibus teste Dom. Geo. Donn [*sic*], cujus filius mecum communicavit." D. Don does not mention this as British in his monograph, and some confusion with *S. nivalis* (cfr. Bot. Mag. *l. c.*) is to be suspected. The Banksian specimen of *S. pilosa* is quoted by Pursh (Fl. Amer. Sept. i. 311).

S. retroflexa Hort. should stand as "ex D. Don in Trans. Linn. Soc. xiii. 450."

**S. rivularis* Townson, Trav. in Hungary, 487 (1793) = carpatica.

["*S. Schleicheri* D. Don ex G. Don in Loud. Hort. Brit. 176 = stellaris." This name should be deleted; G. Don (*l. c.*) merely enters it, as D. Don had done previously, as a variety of *stellaris*.]

**S. sedioides* D. Don, *l. c.* 408 (sphalm. ?) = sedoides.

S. serratifolia Mackay should stand as "ex D. Don in Trans. Linn. Soc. xiii. 352."

S. spicata D. Don, *l. c.* 354. *S. Geum* Pursh, Fl. Amer. Sept. i. 311, non L. The type represented by these names is a plant in Herb. Banks collected in Sledge Island, on the north-west coast of America, by David Nelson. The former name is not taken up by Engler, The plant is no doubt correctly referred by Mr. B. D. Jackson to *S. cuneifolia* L., but is a somewhat extreme form of that variable species, remarkable for its shortly branched spicate panicle. This seems to be the *S. Geum* of recent American authors, but cannot be synonymous with that species, which, so far as I know, is confined to the Old World. Torrey and Gray adopt the name *S. æstivalis* Fischer for the American plant, but I follow Engler in taking up *S. cuneifolia* L.

S. verna Hort. should stand as "ex Haw. Saxifr. Enum. 9 (1821)."

BOTANICAL EXCURSIONS IN WEST DONEGAL, 1898.

By H. C. Hart, F.L.S., &c.

On the 17th July I crossed the Moross ferry into the district known as the "Between Waters," that part of Fanet lying between Mulroy Lake proper and its eastern arm running north. The ferry is interesting as being close to a site for a rare shell, *Lima hians*, and for the great beds of *Zostera marina*, profusely adorned with a species of *Sagartia* (sea anemone), which is determined to claim a botanical character, since it is called here "nettles," and they say it stings tender parts of the body. Thence I crossed the hills Leat and Truskmore, on the former of which is a good growth of *Pyrola media*, and made my way down to the western shore of Fanet by Lough Nagreany to Doaghmore Strand, a very remote district. By a small stream, over sandy mud, *Ranunculus trichophyllus* was found, and a considerable stretch of interesting-looking sandhills yielded nothing. A little further on, on a rocky coast, *Ligusticum scoticum* was in full blow, and right on the rocky edge of the "Narrows" of Mulroy I found a very handsome *Anthyllis* variety, two feet high, with erect hardly branched stems, lemon-coloured flowers larger and fewer in number than type, and

the swollen woolly snow-white calyx very conspicuous. I brought home roots to my garden. I believe it goes by the name of *A. maritima.*

A few miles further on the rocky coast ends at Sessiagh Bay, and I left it to cross a wide district inland. In dykes leading to a small lake—Gortnatra or Groo Lake—a very remarkably broad-leaved *Potamogeton* of the *pusillus* type turned up. At first Mr. Bennett referred it to *P. Friesii*, but asked for more later in fruit, when he decided it was only a form of *P. pusillus.* It is a long way off from the var. *tenuissimus*, found later in Inishowen. About two miles further on, in a bee-line to Kindrum, I found quantities of *Scleranthus annuus* in waste cultivated land, making the third time of seeing it in Donegal, always in Fanet; and not far from this, between Lough Shannagh and Doaghbeg, I found *Vicia angustifolia*, very rare in Donegal.

July 31.—Starting from the same point, I followed the Mulroy coast round most of its north-western shores of Fanet. Near the ferry, in a boggy brackish lakelet, is a plentiful growth of *Scirpus Tabernæmontani*, which is very distinct, and also rare in the north-west. Near Glinsk bay or boat-harbour I was glad to get a comfortable home of *Statice bahusiensis* (*rariflora*), the first Fanet locality. It is very rare in Donegal, occurring on the opposite shore of Mulroy, in Rossgull, and not again till Donegal Bay is reached. The present locality is the extreme northern point of its range in Ireland, and its western range is broken from Donegal to Southern Mayo, and from that to Limerick. Visiting "Groo Lough" again, I obtained some *Characeæ* of no great interest, and more *Potamogeton pusillus* of this "latifoliate" variety. At Tullyconnell Lake, on the way back through another inland section of this considerable peninsula, there was abundance of *Chara* (*fragilis*) *delicatula* and *Potamogeton Zizii*, but the latter was barren, and I cannot vouch for it. On a later date (Aug. 21), when I returned for fruiting *Potamogeton*, I followed the extreme north-west coast of Fanet, by Ballywhorisky Point and Island round to the Bottom shore. Some of these walks (especially this) were very severe. On the storm-swept oceanic verge there was still something to be found. North of Sessiagh Bay there is a good habitat for *Euphorbia portlandica* and *Crithmum maritimum.* These are both rare in this district, especially *Crithmum*, which suffers a good deal from human interference. *Sagina maritima* is remarkably persistent on the wave-washed granite at the edge of this low rocky coast. It is often hard to distinguish from *S. apetala*, of which it is now considered to be a form by some.

About Sessiagh I found a very odd little *Daucus*, with convex fruiting umbels. It was about half-way between the type and what botanists called *D. gummifer.* Its peculiar habit is largely due to sheep-grazing, like that of Euphrasias and Erythræas in similar places. Further round the coast, between Rinboy Point and Rinboy Lough, I lit on a good growth of *Ononis repens* (*inermis* Lange). This is the third and the most western Donegal locality. Both the

others are on the Foyle coast, in Inishowen. In a ditch from this lake, between it and Lough Doo, grows a huge *Carex ampullacea*. Mr. Bennett refers it "probably" to var. *planifolius* of Norman. The type, over which it towers by a foot, was alongside. I gathered a similar form once near Churchill by Lake Akibbon, which had also markedly floating leaves, but it was not as aberrant as this. One of these days a flight of about eight choughs flew over me, a very rare bird now in Fanet. In several places along this extreme coast I gathered *Erythræa Centaurium* var. *pseudo-latifolia*, very condensed. *Cladium Mariscus* was seen at Tullyconnell Lake. It occurs in several Fanet lakes, and marks at once the gliding into the western flora. It is very rare (a single station) in Inishowen. Near the Knockalla end of Ballinastocker Bay I gathered, a few days later, *Polygonum Raii*, and by one of the lakes in the mountain above *Vaccinium Vitis-Idæa*, in flower and fruit; and in the lake, *Isoetes* and *Sparganium alpinum*. At the foot of the mountain (Magherawarden) a remarkably narrow-leaved *Achillea Ptarmica* occurs, and close by, *Rubus hemistemon*.

On August 3rd I found myself in very uncomfortable quarters in Clonmany, the district at the eastern entrance to Lough Swilly, stretching round towards Malin along the Atlantic. Ere long, when the railway is opened to Carndonagh, four or five miles from my headquarters, this country will be transformed. A more delightfully pretty country could not be found. Owing to the high-lying moors and mountains of central Inishowen, and its western margin, where there is much of the country from 1000 to 2000 feet above sea-level, there are several good-sized streams which flow through steep-sided, well-wooded, and beautiful valleys. The sea-coast has every variety of cliff and strand, and no doubt there is a great future in front of Ballyliffin and Clonmany. I have been through this district somewhat too rapidly on previous occasions, especially with the hope of rediscovering *Crambe maritima*, a long-time missing quantity. Further, I had hopes of other rarities in this little-known county, on to the extreme northern point in Ireland—Malin Head. The rivers, all of which I examined from source to mouth, generally about ten miles long, with occasionally tremendous torrents, were a disappointment. Facing north, and with every requisite condition as they have in shelter, cliff, and inaccessibility, I could not have believed they would prove so bare of interest botanically. Not a hawkweed, not an interesting willow; so different from the west of the county. Fanet has no rivers, so the comparison does not exist. The Inishowen *Hieracia* are all on the rocky hills, spinks, and mountain declivities, such as The Mintiaghs, Crock-Augrim, Bulbin, Coolcross, or Slieve Snaght.

Aug. 3.—Followed the Clonmany River to the sea from the "Cross," a couple of miles or less. Nothing remarkable occurred; tansy and comfrey and very tall *Polygonum amphibium*, three feet in height, arrested my attention. A wide extent of sandhills lies along Clonmany Bay, with the usual assemblage of maritime plants, *Honkeneya*, *Cakile*, *Eryngium*, and *Salsola*. There is

curious consolidated sand formation here, which occurs also along Ballinastocker strand on the Fanet coast. It has the appearance of being laminated externally, but when broken up presents no signs of stratification. The parallel external layers seem to be the work of excavating wind and sand, and I suppose the regularity may be illustrated by that of ripple-marks. What binds it together is not very clear, as there is no lime about. I have noticed it elsewhere in Donegal. Along these low sand-escarpments *Poa loliacea* is not uncommon. Here I had much conversation with fishermen and those gathering seaweed for manure (for there is little kelp burned now) with reference to their names for various seaweeds, which they know only by their Irish equivalents, "liagh," "slatmaragh," "dulse," "doolaman," "carrigeen," "rappan," "fammilyagh," and "mechals." These in the order mentioned signify *Laminaria* generally, the stalks of *Laminaria*, *Rhodymenia palmata*, *Fucus ceranoides*, *Chondrus crispus*, *Laminaria saccharina* (but in Fanet a name for a variety of dulse), *Fucus* generally, and *Alaria esculenta*. Here I procured two "ould residenters" to help me to search for *Crambe maritima* along the heavy shingles of Norway Point, Mr. C. Moore's original discovery-spot. I had no need to describe or assist these old "shell-backs," they knew *Crambe* well as "Strand-cabbage." But it was seven years or eight since it had been seen there. It is generally devoured at once by rambling sheep. At another point further west some younger men tried to pass off *Beta maritima* upon me, with radical leaves and no stem-growth. They had seen the white flowers on it! This was the season for drying the carrigeen, or Irish moss, which has also the name of "mother-of-dulse." I found that as they gathered the dulse and carrigeen these amphibious people kept on nibbling mechals, the lower appendages of the *Alaria* frond, which they call also "purses" (pursill). Groups of people, young men and maidens, from the far back of the parish, were rambling amongst the tidal rocks, gathering limpets and making very merry over it. They came from afar off, put up their carts at a friend's house, and, provided with porringers, tin cans, or any sort of vessels, and a blunt "gallion" or old knife, they keep holiday, and bring home quantities of these "barnyeuchs" as a "kitchen" to their "praties." Dulse, they say, keeps off starvation, and carrigeen is good against consumption. The *Crambe* grew at the extreme end of Norway (Tullagh) Point. These heavy shingle plants, such as *Euphorbia*, *Peplis*, *Mertensia*, *Glaucium* and *Crambe* get terribly knocked about by exceptional storms.

From Tullagh Point I went west to Dunaff Head, determined to leave no *Crambe* nook unexamined. This headland has on its magnificent cliffs the only Donegal station for *Silene acaulis*. It is there still in about the same quantity for upwards of twenty years, in a place that some people would not care to linger over. Not far off another very rare Donegal plant grows, towards the south face of the Swilly headland, *Vicia lathyroides*. From Dunaff Head I followed the Swilly coast southward to Leenane, anxious to

rediscover *Mertensia*, which is said to have been found here some fifty years ago. But it has disappeared. There are fine clumps of *Ligusticum scoticum* along here, but nothing else of interest. *Radiola millegrana* is common on Dunaff Head; it certainly affects peaty pastures by the sea, and *Senecio sylvatica*, a plant with a vague sort of distribution, nowhere continuous, also appeared. This latter has a fancy for the roofs of old cabins, or the crumbling remains of sod-dykes; and it also puts in an early appearance on burnt heather. From Leenane I made my way home in the dusk, gathering *Arctium minus* by the roadside near Clonmany chapel. *A. intermedium* is the commonest Donegal form. *A. major* seems to be absent.

Aug. 4.—Yesterday I was informed that on a rocky islet, Carthan Island, I would find the "Strand-cabbage." As this islet is accessible at low water, I felt bound to return and search it, which I did with two assistants, and only felt that I had wasted half a day. However, had I not gone, I should have for ever reproached myself. There was a wreck here some twenty years ago, and all the rats took up their abode on this island, which possesses about a rood of soil, the rest being naked rock with *Aster* and *Anthemis* in abundance. This soil was riddled with their holes. After several years' residence the rats left in a body. Perhaps they had finished the *Crambe*. Two odd modern geological phenomena are observable here. In one case there is a raised beach up to twenty feet above the tide which is turning to green sward with grass and a few weeds over heavy shingle. This growth and consolidation is largely aided, and even started, by blackthorn and bracken. The reverse process is carried on by human beings. As soon as this scraw is of any solidity they carry it off for fuel, turf being very scarce, from just above high-water mark, This lets in the tide in a heavy gale. The shingle becomes again movable, and quantities of dead blackthorn scrub attest the result.

From this time-wasting island I wended my way eastward, along Clonmany strand. At a group of cabins, known as Tullagh, I found considerable quantities of three interesting plants amongst waste ground: *Carduus crispus*, *Ballota nigra*, and *Allium Babingtonii*, all under suspicious circumstances, to say the least of it. Even as an established waste-ground species *Ballota* is very rare in Donegal. Of the thistle more by and by. The *Allium*, or "potato-garlic" as they call it, is often seen established, but never (as is Aran) removed from cultivation to any distance.

Following the margin of cultivation I saw a few stray scarlet poppies (*P. dubium*). There is an interest in noticing various less ubiquitous weeds here, since we are at their northmost limits in Ireland. Presently I had to remove my lower garments and wade the mouth of the Clonmany River. Below Tullagh House there is abundance of *Blysmus* (*Scirpus*) *rufus*. Further on, at the end of the bay, we come to steep rocky bluffs, flanked at first with sand-hills, which form the sea-margin of a bold face of cliffs known as Binnion (818 ft.). On the first bluff I gathered a *Hieracium* (un-

determined), and immediately alongside of it *Euphorbia portlandica*, which Mr. C. Moore has recorded from here. On the sandhills *Viola Curtisii* is plentiful, and for the first time I saw a *Hieracium* in reach of the sea-spray at ordinary high tide. A rocky, pretty little point, "Suil Point," stretches out here from a considerable tract of dunes. On the way to it I found *Viola canina* in plenty; it is rare in Donegal: also two extensive patches of *Nepeta Glechoma*, which is most unaccountably scarce in this region; a small scrap, not fit to record, near Ballyshannon, and a plentiful but single patch at Ray, near Raymullan, is all I know of it in Donegal. *Ranunculus bulbosus*, said formerly (and still) to be rare in Donegal, is always abundant. The name of this point set me thinking. It is a time-honoured belief, which is rigorously taught to all new-comers, that Lough Swilly is derived from an Irish word signifying shadow, and that the name signifies, so appropriately and poetically, the Lake of the Shadows. Alas! *suil* means an eddy or whirlpool, literally, "an eye." The river Swilly is full of these, and gave its name to the lough. From Binion I made my way back by a very pretty old lane to the "Cross of Clonmany." On the ditch-bank, at a place called Tanderagee, a tiny hamlet, *Lycopus europæus*, very local in Donegal, occurred, as did also *Bidens tripartita*.

Aug. 5.—Went in for a long day's work. Leaving early, I went through Ballyliffin to Pollan Bay. About Clonmany village walls *Asplenium Ruta-muraria* is commoner than usual in North Donegal. Close to Ballyliffin, at Cloghorna, *Mentha piperita* is well-established. *Carduus setosus*, a variety of *C. arvensis*, is frequent. The most attractive object here was a magnificent Yankee work of art, a giantess scarecrow, fully dressed, in a tragic attitude and a wonderful hat. Pollan Bay is a dreary waste of recently tide-invaded sandhills—a waste which stretches across to Trawbreaga Bay, leaving seaward Doagh Island. The coast here is complicated. At the head of this bay lies Malintown, on an estuary of the same name. This forms the eastern boundary of Doagh Island. I took some wide casts through these Pollan sandhills, seeing nothing except some remarkable *Eryngium*. These plants were a couple of feet high, with ivory-white or greyish polished stems, and very brilliant petals,—a really beautiful plant. It is odd how beautiful anything a little nice becomes in such a place. Always I was looking for *Crambe*. On the first shingle of the island was a dwarf *Silene maritima*, with an equally dwarfed *Senecio vulgaris*, the latter having very distinct dark markings on the involucral bracts, giving the heads a speckled appearance; I have seen this form before on sea shingle. About a small and ruined castle—Carrick-abreaghy, on the north-west coast of Doagh, *Senebiera Coronopus* occurs. It has only one other locality in the county that I know of. There are many likely beaches, and here and there a sea-weed-man along here. Neither silver, nor blandishments, nor untiring search will produce *Crambe*. Along here there were many evidences of the effects of the terrible "Christmas storm" of 1894, which raised the highest tide on record in this part of Ireland.

One inhabitant told me it took twenty men to get the big "burlian" (heavy shingle) stones out of their house, that came in with the sea and up a drain-pipe! On the east side of Doagh I sat down with one Toland—honest man—who saw me picking "yerribs," and unsolicited brought me to where *Crambe* had been in plenty two years before. Of this man's evidence and description I had no doubt, so that the plant evidently appears occasionally. This strand is a very likely one, and better sheltered from the sea than most. It is called Lagacurry. In a small marsh close to the beach the form *tenuissimus* of *Potamogeton pusillus* was plentiful; it does not seem to have been noted in Ireland. Mr. Bennett named it for me. On round Doagh, *Senecio flosculosus*, *Blysmus*, *Lycopsis*, *Œnanthe Lachenalii*, *Ranunculus sceleratus*, and *Hippuris vulgaris* were the only plants of the least interest. *Carex ovalis* I saw, too; it seems to be of sporadic occurrence in Donegal. Doagh Island is about eight or ten miles round. It was probably a true island within the historical period.

Aug. 6.—I heard much of a waterfall at Glenhouse, near Clonmany, and a very pretty little sheer fall of about fifty feet it is. About it *Lastræa æmula* is plentiful, a very western fern, but nevertheless it occurs frequently east of Donegal. *Digitalis* is far commoner in Inishowen than in Fanet. The glen below the fall is most picturesque, and holds the record for "clegs" (horse-flies). Instead of a good hawkweed along this glen, there was only the impostor *Crepis paludosa*. Up this fall, across the moor, lies a round-topped hill, Raghtinmon, 1657 feet. There is no land in Ireland higher than this to the north of it, but it is of uncompromising quartzite, and utterly uninteresting. *Hymenophyllum unilaterale* lives close to its storm-swept summit. A very large cairn adorns the summit of Rathlin, of Ordnance Survey construction. There is however an ancient one close by known as "Mescaun Maiwa," and thereby hangs a tale pertaining to legend and folklore which cannot be told here. From this summit I crossed a valley and another lower top—Slievekeeragh, and thence down to Effishmon. Here there were some interesting bluffs which yielded a hawkweed, *H. Schmidtii*. Thence I followed a stream down to Clonmany, where *Lastræa Oreopteris* abounds. This fern is quite characteristic of the Inishowen glens. *Osmunda* and beechfern seem to be wholly absent. The rarity of *Osmunda* in Inishowen is most remarkable. At this point (Effishmon) I was on the slopes of Bulbein Mountain, where several good alpines grow, which (some of them) were first made known by the great Robert Brown. But I had no excuse to climb that dainty little peak, so often have I examined it. A little down the stream *Lychnis Githago* was very plentiful in vetches, as usual. Sat up late gleaning legends and tales of evil eye and butter-witches from an "ould residenter."

(To be continued.)

BIOGRAPHICAL INDEX OF BRITISH AND IRISH BOTANISTS.

By James Britten, F.L.S., and G. S. Boulger, F.L.S., F.G.S.

First Supplement (1893–97).

(Concluded from Journ. Bot. 1898, p. 446.)

Robertson, Rev. Andrew (fl. 1780–1845). Minister of Inverkeithing, 1792–1845. Botany of parish in 'New Statistical Account of Scotland,' vol. ix. 230–4, 1845; and list in Trans. Bot. Soc. Ed. xx. 85.

Robertson, David (1806–96): b. Glasgow, 28 Nov. 1806; d. Millport, Cumbrae, 20 Nov. 1896; bur. Cumbrae Cathedral. LL.D., Glasgow, 1894. F.L.S., 1876. Algologist. Pres. Nat. Hist. Soc. Glasgow, 1887–90. 'Botany of Loch Ryan,' Proc. Nat. Hist. Soc. Glasgow, i. 21. 'Algæ on Buoys in the Clyde,' Proc. Phil. Soc. Glasgow. R.S.C. v. 230; viii. 760; xi. 194; 'The Naturalist of Cumbrae,' by Rev. T. R. R. Stebbing, 1891; Journ. Bot. 1897, 32; Proc. Linn. Soc. 1896–7, 66; Trans. Nat. Hist. Soc. Glasgow, 1896–7, 18.

Rivers, Thomas (1798–1877): b. Sawbridgeworth, Herts, 27 Dec. 1798; d. Sawbridgeworth, 17 Oct. 1877; bur. Sawbridgeworth. Nurseryman. Rose-grower and pomologist. Journ. Hort. 1877, xxxiii. 327, 342; Loudon, Arboretum, ii. 350; Dict. Nat. Biog. xlviii. 333. Portr. (1870) at Royal Hort. Soc.

Romanes, George John (1848–94): b. Kingstown, Canada, 20 May, 1848; d. Oxford, 23 May, 1894; bur. Holywell Cemetery. B.A., Camb., 1870. LL.D., Aberdeen. F.L.S., 1875. F.R.S., 1879. Founded Romanes Lectureship at Oxford. Experimented on graft-hybrids. 'Life and Letters,' with portr., 1895; Dict. Nat. Biogr. xlix. 179; Proc. Linn. Soc. 1893–4, 34; R.S.C. viii. 772; xi. 211; Allibone Supp.

Romans, Bernard (fl. 1743–83): b. Holland; d. at sea between Jamaica and U.S.A., 1783. Educated as engineer and surveyor in England. King's botanist in Florida, 1763–71. 'Nat. Hist. of Florida,' 1775. Sargent, Silva of N. America, iv. 5.

Roper, Freeman Clarke Samuel (1819–96): b. Hackney, 23 Sept. 1819; d. Eastbourne, Sussex, 28 July, 1896. F.L.S., 1857. 'Flora of Eastbourne,' 1875 (portr.). 'Ranunculus Lingua,' Journ. Linn. Soc. xxi. 380. Collection of diatoms bequeathed to Brit. Mus. Herb. bequeathed to Sussex County Museum, Brighton. R.S.C. v. 271; viii. 777; xi. 215; Jacks. 251; Journ. Bot. 1896, 430, with portr.; Proc. Linn. Soc. 1896–7, 67.

Rotherham, John (1750?–1804): b. Hexham? c. 1750; d. St. Andrews, 6 Nov. 1804. M.D., Upsala. F.L.S., 1788. Pupil of Linnæus. Prof. Nat. Phil., St. Andrews, 1795; 'Sexes of Plants vindicated,' 1790. Pritz. 270; Jacks. 8; R.S.C. v. 303; Gent. Mag. 1804, ii. 1079; 1830, ii. 565; Dict. Nat. Biogr. xlix. 300; Allibone.

Rottler, Johann Peter (1749–1836): b. Strasburg, June, 1749; d. Madras, 27 Jan. 1836. Herbarium at Kew. R.S.C. v. 304; Journ. Bot. 1851, 67; Bot. Gazette, iii. (1851), 55.

Roxburgh, John (fl. 1809). Son of William Roxburgh. Resided at Cape four to five years for purpose of collecting. Sent pl. to Lambert. Plants in Brit. Mus. D. Don, Appendix to Lambert's 'Pinus,' p. 15.

Roy, John (1826–93): b. Ardoch, Fowlis Webster, Perth, 24 Feb. 1826; d. Aberdeen, 18 Dec. 1893. Of Aberdeen. LL.D., Aberdeen, 1889. Desmidologist. Contrib. to Cybele Brit., Top. Bot., and Eng. Bot. ed. 3. 'Notes on Japanese Desmids,' Journ. Bot. 1886. MS. 'Flora of N.E. Scotland' (with Rev. John Fergusson). R.S.C. xi. 234; Journ. Bot. 1894, 159; Ann. Scott. Nat. Hist. 1894, 72 (portr.).

Rudge, Samuel (1728–1817): b. Thornhaugh, Northampton, 1728; d. Watlington, Oxon, 24 Jan. 1817. At Elstree, Herts, thirty-eight years. High Sheriff of Northamptonsh., 1792. Studied Botany from 1750, and made "innumerable MS. notes in almost every botanical work that he possessed." Nat. Hist. library bequeathed to his nephew, Edward Rudge. Gent. Mag. 1817, i. 181; Druce, Fl. Berks. cxlvi.

Russell, Isaac (fl. 1820–43). Of Oxford. "Botanical draughtsman and glass painter." Largely illustrated Baxter's 'British Flowering Plants,' 1834–43. Baxter, Brit. Phænog. Bot. 505.

Salesbury, or **Salisbury, William** (c. 1520–c. 1600): b. Llansannan, Denbighsh., c. 1520; d. c. 1600. Lexicographer. Wrote a Welsh Botanology (unpublished), "an original work, showing close observation of plant life." Dict. Nat. Biogr. l. 196. Journ. Bot. 1898, 12.

Salter, Samuel James Augustus (1825–97): b. Poole, 10 Aug. 1825; d. Basingfield, Hants, 28 Feb. 1897. Dental surgeon. M.B., London. F.R.S., 1863. F.L.S., 1853. 'Polliniferous Ovules in Passiflora,' Trans. Linn. Soc. xxiv. 143. R.S.C. v. 384; viii. 820; xi. 268; Proc. Linn. Soc. 1896–7, 68; Proc. Roy. Soc. lxi. p. iii.; Gard. Chron. 1897. i. 163.

Sandys, Edwin (1689–1724): b. Petherton, Somerset, c. 1689; d. Oxford ?, 1724. M.D., Oxon, 1718. Prof. Bot. Oxon, 1720–1724. Alumn. Oxon.

San Giorgio, Contessa Anna di (*née* **Harley**) (1803–74): b. Florence, 31 July, 1803; d. Florence, 18 May, 1874. 'Cat. poliglotto delle piante,' 1870. Jacks. 9; Saccardo, La Botanica in Italia, 145.

Scampton, John (fl. 1716). "A curious Botanist." Sent *Calamagrostis lanceolata* to Petiver from Leicestershire. Conc. Gram. 69; Clarke, 90.

Semple, Charles Edward Armand (1845–95): b. 1845 ?; d. 5 March, 1895. B.A., Camb., 1867; M.B., 1873. 'Aids to Botany,' 1877. Jacks. 58.

Shepherd, Joseph (1807–59): b. 1807; d. Sowerby, Halifax, Yorksh., 7 June, 1859. 'List of pl. of Halifax,' 1836. Con-

tributed to 'Flora Mancuniensis,' and to completion of Baines's 'Flora of Yorkshire,' 1840. A founder and president of Todmorden Bot. Soc. Herbarium in possession of family.

Shore, Margaret Emily (1819–39): b. Bury St. Edmunds, Suffolk, 25 Dec. 1819; d. Madeira, 7 July, 1839; bur. Strangers' Burial-ground, Funchal. Numerous notes on plants in 'Journal of Emily Shore,' with portr., 1891.

Sim, John (c. 1812–93): b. Aberdeenshire, c. 1812; d. Dunfermline, 1893. Assoc. Bot. Soc. Ed. Herd-boy; afterwards in 92nd Regiment (1832–55); then Sergeant-instructor of Militia in Perth. Contrib. to Phytologist, ii–vi, n.s. (1857–63) and to Midland Naturalist, 1864–5. Letters in Wilson's correspondence. Herbarium at Perthsh. Soc. Nat. Science. R.S.C. v. 699.

Simmonds, Peter Lund, *né* **Lund** (1814–97): b. Aarhuus, Denmark, 1814; d. London, Oct. 1897. F.L.S., 1886. Knight of the Legion of Honour, 1878. Knight of the Crown of Italy, 1878. Brother of the Charterhouse. Exhibition Commissioner. 'Waste Products and Undeveloped Substances.' 'Commercial Products of Vegetable Kingdom,' 1853. Edited 'Technologist' and 'Journ. of Applied Science.' R.S.C. v. 700; viii. 957; Jacks. 192; 'British Roll of Honour,' 1887, 479; Athenæum, 1897, ii. 493.

Smellie, William (1740-95): b. Pleasance, Edinburgh, 1740; d. Edinburgh, 24 June, 1795. Printer. Zoologist. Pupil and deputy lecturer of Hope. Gained Hope's gold medal. Formed a herbarium of Scottish plants. Memoir with portr. engr. by Lizars in Jardine's 'Birds of Great Britain,' vol. ii.

Smiles, F. H. (d. 1895): d. Korat, Siam, May, 1895. Of Royal Survey Dept. of Siam. Sent plants to Kew. Kew Bull. 1895, 38, 198.

Smith, Christian (1785-1816): b. Drammen, Norway, 17 Oct. 1785; d. Congo, 21 Sept. 1816. Travelled in British Isles, 1814. Prof. Bot. Univ. Christiania. To Madeira, Teneriffe, &c., 1815. Congo Expedition, 1816; Journal in Tuckey's 'Narrative,' 229-336; Pl. described by R. Brown in Appendix, v. 'Dagbog paa Reisen til de Canariske, 1815' (ed. F. C. Kiær), 1889. Pl. and MS. Biography in Bot. Dept. Mus. Brit. Jacks. 346; Tuckey's Narrative, lxiii.

Spruce, Richard (1817–93): b. Ganthorpe, N. Yorkshire, 10 Sept. 1817; d. Coneysthorpe, Castle Howard, N. Yorkshire, 28 Dec. 1893; bur. Terrington, Yorkshire. Ph.D., Berlin, 1864. F.B.S.Ed., 1842. A.L.S., 1893. Bryologist. 'Mosses of Eskdale,' Phyt. i. (1841), 540. In S. America, 1849–64. 'Palmæ Amazonicæ,' Journ. Linn. Soc. 1871, 65. 'Hepatics of Amazons and Andes,' Trans. Bot. Soc. Ed. vol. xv. R.S.C. v. 785; viii. 993; xi. 469; Jacks. 377; Journ. Bot. 1894, 50; Trans. Bot. Soc. Ed. xx. 99; Proc. Linn. Soc. 1893–4, 35; Dict. Nat. Biogr. liii. 431. *Sprucea* Wilson. *Sprucella* Stephani.

Stables, William Alexander (fl. 1836). Of Cawdor. Gordon, Fl. Moray. Murray, Northern Flora. Top. Bot. 556; Ann. Scott. Nat. Hist. 1894, 66.

Steuart, James Henry Augustus (1835?–95): b. Sunningdale, Berks, 1835?; d. Ventnor, I. of Wight, 26 Feb. 1895; bur. Kensal Green. Captain in Surrey Militia. Memb. Bot. Exchange Club. '*Gentiana Amarella* var. *præcox*,' Journ. Bot. 1889, 217. Herbarium in Nottingham Museum. Journ. Bot. 1895, 128.

Stonham, William Burne (d. 1896): d. Maidstone, 6 Dec. 1896. F.L.S., 1895. Collected in Kent when young. "An ardent botanist." Proc. Linn. Soc. 1896–7, 68.

Sullivan, David (1836?–95): b. 1836?; d. Moyston, Victoria, Australia, 2 June, 1895. Schoolmaster. F.L.S., 1884. Correspondent of F. von Mueller. 'Census of Grampian Plants.' "An enthusiastic botanist." Proc. Linn. Soc. 1895–6, 47.

Suttor, George (1774–1859): b. 1774; d. Alloway Bank, near Bathurst, N.S.W., May, 1859. F.L.S., 1843. Went to New South Wales at Banks's advice to collect, and to introduce fruit trees, 1798. 'Culture of the Grape-vine and Orange in Australia,' 1843. 'Timber-trees of Australia,' Proc. Linn. Soc. i. 177. Proc. Linn. Soc. 1859–60, xxxiii.

Taylor, John Ellor (1835–95): b. Levenshulme, Manchester, 1835; d. Ipswich, Suffolk, 28 Sept. 1895. F.L.S., 1873. Editor, 'Science Gossip,' 1872–93. Curator, Ipswich Museum. 'Flowers, their Origin . . . ,' 1878. 'Sagacity and Morality of Plants,' 1884. Jacks. 611; R.S.C. viii. 1064; xi. 558; Journ. Bot. 1895, 352; Proc. Linn. Soc. 1895–6, 47.

Taylor, Simon (fl. 1750–94): d. 1794, 1797, or 1798. Botanical painter. Painted for Lord Bute and Fothergill. Paintings bought by Empress of Russia. Linn. Corr. i. 255; Pilkington, Dict. of Painters; Bryan; L. B. Phillips, Dict. Biog. Reference.

Thomson, Joseph (1860–95): b. Penpont, near Thornhill, Dumfries, Feb. 1860; d. London, 2 Aug. 1895. African traveller. Collected in Eastern Equatorial Africa, 1882–3, Journ. Linn. Soc. xxi. 397. R.S.C. xi. 591; Geogr. Journ., Sept. 1895; Athenæum, 1895, ii. 195. *Impatiens Thomsoni* Hk. f.

Tinker, Jethro (1788–1871): b. 25 Sept. 1788; d. Staleybridge, 10 March, 1871. Working-man. Botanist and entomologist. Contrib. to Buxton, Bot. Guide (p. ix). Herb. in Stamford Park Museum. Monument in Stamford Park, between Ashton and Staleybridge, inscribed "our local Linnæus."

Traill, George William (1836–97): b. Kirkwall, Orkney, 26 Oct. 1836; d. Joppa, near Edinburgh, 7 April, 1897. Algologist. 'Algæ of the Forth,' 1885. 'Algæ of Joppa,' 1886. 'Algæ of Orkney,' 1890. Herbarium in Herb. Bot. Soc. Edin. Jacks. 246; R.S.C. xi. 631; Orkney Herald, 14 April, 1897; Ann. Scott. Nat. Hist. 1898, 7; Journ. Bot. 1896, 10; 1897, 440, with bibliogr. *Trailliella* Batters.

Trimen, Henry (1843–96): b. Paddington, 26 Oct. 1843; d. Peradeniya, Ceylon, 16 Oct. 1896; bur. Kandy. M.B., Lond., 1865. F.L.S., 1866. F.R.S., 1888. Assistant Bot. Dep. Mus. Brit., 1869–79. Bot. Lecturer, St. Mary's Hospital, 1877.

Director Bot. Gard. Peradeniya, 1879. Discovered *Wolffia arrhiza*, 1866. 'Flora of Middlesex' (with W. T. T. Dyer), 1869. Edited 'Journ. Bot., 1871–79. 'Medicinal Plants' (with Robert Bentley), 1875–80. 'Handbook to the Flora of Ceylon,' 1893–95. R.S.C. vi. 40; viii. 1115; xi. 644; Pritz. 323; Jacks. 614. Journ. Bot. 1896, 489, with portr.; Proc. Linn. Soc. 1896–7, 70; Kew Bull. 1896, 219.

Trimmer, Sarah, *née* **Kirby** (1741–1810): b. Ipswich, 1741; d. 15 Dec. 1810; bur. Ealing. 'Introduction to the Knowledge of Nature,' ed. vi. 1789; ed. xi. 1802. 'Life,' 1814. Portr. by H. Howard, R.A., in Nat. Portr. Gallery.

Trowe, Gilbert (1685–1734): b. Abingdon, Berks, c. 1685; d. Oxford ?, 1734. B.A., Oxon, 1704. M.D., Oxon, 1723. Prof. Bot. Oxon, 1724–8. Alumn. Oxon.

Tullidelph, Walter (d. c. 1739). Amanuensis to James Douglas; afterwards planter and medical practitioner in Antigua. Correspondent of John Martyn. Plants in Herb. Sloane, lx. and lxxxii., with letters to Sloane and lists of plants. Other letters in Sloane MSS. 4064. Gorham, 19.

Tunstal, Mrs. Thomazin (fl. 1629). Of Bull-banke, near Hornby Castle, Lanc. "A great louer of these delights." Sent many plants to Parkinson, and botanized at Ingleborough. Parkinson, 'Paradisus,' 348, &c.; Pult. i. 154.

Turner, John (fl. 1795). Of Lympston, Exeter. Added *Oxalis corniculata* to Brit. flora, 1795; Berkenhout, Syn. ii. 141; Clarke, 21.

Tyacke, Nicholas (fl. 1820–40): b. Cornwall. M.D. Orig. Member Bot. Soc. Edinb. Distinguished *Lamium intermedium* as British. Rept. Bot. Soc. Edinb. 1836–7, p. 33. E. B. S. 2914, 2983. Herbarium in Chichester Museum.

Vasey, George (1822–93): b. Snenton, Yorks, 22 Feb. 1822; d. Washington, U.S.A., 4 March, 1893. To America, 1823. M.D., Pittsfield, Mass., 1846. Curator U.S. National Herbarium. Wrote on grasses and forage plants. 'Forest Trees of the United States,' 1876. Jacks. 360; R.S.C. viii. 1144; Bot. Gazette, 1893, 170 (portr. and bibliogr.). *Vaseya* Thurber = *Muhlenbergia*. *Vaseyanthus* Cogn.

Veitch, James (1792–1863): b. Killerton, Exeter, 25 Jan. 1792; d. Exeter, 14 May, 1863. Nurseryman. Cott. Gard. xiii. 273 (portr.); xxix. 362.

Veitch, James (1815–69): b. Exeter, 24 May, 1815; d. Chelsea, 10 Sept. 1869; bur. Brompton Cemetery. Son of preceding. Nurseryman. Bought Knight & Perry's Nursery, 1853. F.L.S., 1862. Portr. in Lindley Library. Gard. Chron. 1869, 990; Proc. Linn. Soc. 1869–70, 114.

Wager, Sir Charles (1666–1743): b. 1666; d. Fulham, 1743; bur. Westminster Abbey. Admiral R.N., 1731. Knighted, 1708. M.P., Westminster, 1732–42. Friend of P. Collinson. Had a garden at Fulham. Rose; Trans. Linn. Soc. x. 282.

Wall, George (1821?–94): b. 1821?; d. St. Thomas's Home, London, 18 Dec. 1894; bur. Bromley Cemetery. Pteridologist. F.L.S., 1872. In Ceylon from 1846. Friend of Thwaites. 'Catalogue of Ceylon Ferns, with notes,' privately printed, 1873: 'Check List,' 1879. Had a large fern herbarium. Jacks. 396; Journ. Bot. 1895, 63. *Trichomanes Wallii* Thw.

Waller, Rev. Horace (d. 1896): d. Twymell, Northamptonsh., 22 Feb. 1896. Missionary in Central Africa. Rector of Twymell, 1874. Mozambique plants at Kew. Journ. Bot. 1896, 190. *Walleria* Kirk.

Walker, Frederick (1829–89): b. Southgate, Middlesex, 4 Dec. 1829; d. Southgate, 20 Dec. 1889. Collected near Abingdon. Druce, Fl. Berks, clxxx.

Warner, Frederick Isaac (1841–96): b. 1841; d. Winchester, 8 Nov. 1896. F.L.S., 1872. Sec. Winchester and Hampshire Scientific Society, 1871–6. Pl. of Winchester in Proc. Winchester Sci. Soc., 1871. Contrib. to Townsend's 'Fl. of Hampshire.' Had a Hampshire herbarium. R.S.C. viii. 1197; Journ. Bot. 1897, 32; Proc. Linn. Soc. 1896–7, 70.

Warren, John Byrne Leicester, 3rd Baron de Tabley (1835–95): b. Tabley Hall, Knutsford, Cheshire, 26 April, 1835; d. Ryde, I. of Wight, 22 Nov. 1895; bur. Lower Peover, Cheshire. M.A., Oxon, 1856. F.L.S., 1864. Poet and numismatist. Correspondent of Watson. Critical in *Rubi*, *Rumex*, *Bromus*, *Callitriche*, &c. Discovered *Rumex maximus*. Described *Callitriche Lachii*. 'Flora of Hyde Park,' Journ. Bot. 1871. 'Flora of Cheshire' (posth.), 1899 (portr.). Jacks. 249, 256; R.S.C. viii. 1198; xi. 752; Journ. Bot. 1896, 77 (bibliogr.); Athenæum, 30 Nov. 1895; Contemporary Review, Jan. 1896; Spectator, 7 Dec. 1895; preface to Fl. Cheshire. *Rumex Warrenii* Trimen = *R. Knafii*.

Weir, John (d. 1898): d. East Barnet, 28 April, 1898. Collector for Royal Hort. Soc. in Brazil and New Granada, 1861–4: returned to England, 1865. Lists and journal in Proc. Hort. Soc. 1863–5; mosses in Journ. Linn. Soc. xii. Plants at Brit. Mus. and Kew. Gard. Chron. 1898, i. 301; Kew Bull. 1898, 175.

Westcombe, Thomas (1815–93): d. Worcester, 9 May, 1893. Collected British plants. Grew Stapelias; collection to Kew Gardens. Helped E. Lees in Botany of Malvern, ed. 2 (pref.). Journ. Bot. 1893, 192; Kew Bulletin, 1893, 186.

White, Charles Frederick (1818–96): b. Poplar, 12 Feb. 1818; d. Clapton, 20 Nov. 1896; bur. Ealing. Drew Mosses, Microscopic Fungi, and pollen. F.L.S., 1876. 'Poppy Pollen from Egyptian Funereal Garlands,' Journ. Linn. Soc. xxi. 251, t. 6. Proc. Linn. Soc. 1896–7, 72.

White, Eliza Catherine, *née* **Quekett** (1812–75): b. Langport, Somerset, 1812; d. Ealing, 14 Nov., 1875. Sister of John Quekett; wife of foregoing. "A good British botanist, a keen collector of mosses and micro-fungi." Proc. Linn. Soc. 1896–7, 73.

White, Francis Buchanan (1842–94): b. Perth, 20 March, 1842; d. Perth, 3 Dec. 1894. M.D., Edin., 1864. F.L.S.,

1873. One of founders of Perthshire Soc. Nat. Sci., Scottish Cryptogamic Soc., and E. of Scotland Union of Nat. Soc. Edited 'Scottish Naturalist,' 1871–82. 'Revision of British Willows,' Journ. Linn. Soc. xxvii. (1889), 333. 'Flora of Perthshire' (posthumous), with memoir and portr., 1898. Jacks. 474; R.S.C. viii. 1229; xi. 795; Trans. Perthshire Soc. Nat. Sci. vol. ii. pt. 3, 1894–5 (portr.); Journ. Bot. 1895, 49; Proc. Linn. Soc. 1894–5, 38.

White, Rev. Gilbert (1720–93): b. Selborne, Hants, 18 July, 1720; d. Selborne, 26 June, 1793; bur. Selborne churchyard. M.A., Oxon, 1746. Marked Selborne pl. in a copy of Hudson Fl. Angl. 'Natural History of Selborne,' 1789. 'Naturalist's Calendar,' 1795. Jacks. 213; Journ. Bot. 1893, 289; Alumn. Oxon.

Whitehead, John (1833–96): b. Dukinfield, Cheshire, 1833; d. Oldham, 6 May, 1896. Cotton operative. Bryologist. Added *Chara Braunii* to Brit. Flora. First President Manchester Cryptogamic Soc. Lists of Mosses in Naturalist, 1886, 85, and Journ. Bot. 1894, 193. Cott. Gard. xxviii. 585; Journ. Bot. 1897, 89 (portr.).

Wickham, William (1831–97): b. London, 1831; d. Binsted Wyck, Hants, 16 May, 1897; bur. Binsted. M.A., Oxon, 1857. F.L.S., 1879. "Investigated botany of East Hampshire." Proc. Linn. Soc. 1896–7, 73; Alumn. Oxon.

Wiles, James (fl. 1790–1805). Gardener to R. A. Salisbury. On Bligh's voyage, 1791–3, with Christopher Smith. In charge of the Bot. Garden, Liguanea, Jamaica, 1793–1805. Pl. coll. with Smith in Herb. Mus. Brit. Sent about 800 specimens to Lambert. Kew Bulletin, 1891, 300–1.

Williams, George (c. 1763–1834): b. Catherington, Hants, 1763?; d. Oxford, 17 Jan. 1834. B.A., Oxon, 1781. M.D., 1788; F.R.C.P., 1799. F.L.S., 1798. Prof. Bot. Oxon, 1795–1834, "although an elegant scholar, added nothing to botanical science." Gent. Mag. 1834, i. 334; Bot. Misc. i. 57–61; Druce, Fl. Berks, clviii; Gard. Chron. 1871, 1427; Munk, ii. 467; Alumn. Oxon.

Williamson, Rev. Alexander (1833–90): b. Scotland, 1833; d. Chefoo, 28 Aug. 1890. LL.D. To China, 1855. 'Elements of Botany' (in Chinese), 1858. 'Journeys in N. China,' 1870 (plants in vol. ii. 439–42). R.S.C. viii. 1244; Bretschneider, 690.

Williamson, William Crawford (1816–95): b. Scarborough, Yorkshire, 23 Nov. 1816; d. Clapham, Surrey, 23 June, 1895. LL.D., Edin., 1883. F.R.S., 1854. Prof. Bot. Owens Coll. Manchester, 1851–92. 'Fossil Pl. of the Coal Measures,' Phil. Trans. 1871–93. Assisted Lindley and Hutton in 'Fossil Flora' from 1832. Curator Mus. Manchester Nat. Hist. Soc., 1835. 'Volvox Globator' (with George Busk), 1853. 'Reminiscences of a Yorkshire Naturalist,' 1896; R.S.C. vi. 380; vii. 1245; xi. 817; Jacks. 178; Journ. Bot. 1895, 298.

Wilson, Alexander Stephen (1827–93): d. Aberdeen, 16 Nov. 1893. Civil Engineer. Experimental and practical botanical

researches. 'The Botany of Three Periods,' 1878. 'A Bushel of Corn,' 1883. 'Ergot,' 1876. R.S.C. viii. 1248; xi. 820; Jacks. 21, 169; Journ. Bot. 1894, 31; Gard. Chron. 1893, ii. 665.

Wilson, Charlotte (fl. 1847). Discovered *Simethis* at Bournemouth, 1847. Gard. Chron. 1847, 467 (misprinted WILKINS, and so entered in 'Biogr. Index,' p. 182).

Wilson, John Bracebridge (1828–95): b. Topcroft, Norfolk, 1828; d. Geelong, Victoria, 22 Oct. 1895. B.A., Camb., 1895, F.L.S., 1882. Head-master Geelong Grammar School, 1863. Phycologist and marine zoologist. Algæ in Bot. Dep. Brit. Mus. Journ. Bot. 1896, 48; 'Eagle,' xix. 500; Memorials C. C. Babington, 269; Proc. Linn. Soc. 1895–6, 48.

Wilson, William (1803–76): b. 3 March, 1803; d. 18 June, 1876; bur. Cartmel Priory Church, Lanc. Gardener to Duke of Devonshire at Holker. Plant-list for Cartmel in Jopling's Sketch of Furness and Cartmel, 1843. Naturalist, 1894, 124.

Woolls, Rev. William (1814–93): b. Winchester, March, 1814; d. Burwood, near Sydney, 14 March, 1893. Ph.D., Göttingen. F.L.S., 1865. Went to N. S. Wales, 1827; ordained, 1873. Incumbent of Richmond, Tasmania. 'Contribution to the Flora of Australia,' 1867. 'Bot. Discovery in Australia,' 1869. 'Lectures on the Veg. Kingdom,' 1879. 'Species pl. paramattensium,' 1871. R.S.C. viii. 1274; xi. 850; Pritz. 351; Jacks. 622; Journ. Bot. 1893, 128; Proc. Linn. Soc. 1892–3, 27. *Woollsia* F. M. = *Lysinema*.

Young, Rev. James Reynolds (c. 1810–84): b. circ. 1810; d. Whitnash, Warwick, 1884. M.A., Camb., 1840; Oxon, 1844. Rector of Whitnash, 1846–76. Hon. Canon of Worcester. 'Cat. Warwicksh. Plants' (with R. Baker) in Proc. Warw. Nat. Hist. Soc. 1874. Had a herbarium. Fl. Warwicksh. 506; Alumn. Oxon.

Young, William (fl. 1753–71); b. Virginia?; d. Virginia? "Botanist to their Majesties," 1764. Introduced *Dionæa* to England. Pupil of Sir John Hill. In England, 1765–6, 1768. MS. 'Natural History of Plants of S. Carolina' (302 figures), (1767), and specimens in Bot. Dept. Brit. Mus. Dryand. Cat. iii. 186. Journ. Bot. 1894, 332.

SHORT NOTES.

BERKSHIRE PLANTS.—On July 18th, in the course of a walk from Wellington College to Sandhurst, and thence along the Blackwater stream to the Royal Military College, I noticed a few local plants in what appear to be new stations:—*Stellaria umbrosa* Opiz. By the river a little below Sandhurst, in considerable quantity.—*Hypericum dubium* Leers. Copse by the river, about half a mile higher up; one good-sized patch.—*Rubus fissus* Lindley. Roadside near Wellington College.—*R. suberectus* grows close by, *R. plicatus*

being frequent thereabouts, as is also *R. holerythros*.—*R. erythrinus* Genevier. Between Wellington College and Sandhurst; the first certain record for Berks. Rev. W. Moyle Rogers endorses the name, but adds that the leaves are untypical. — *R. calvatus* Blox. Plentiful in a boggy fir-wood, R. M. College. Determined by Mr. Rogers as exactly Bloxam's plant. New county record.—*R. Koehleri* W. & N. var. *cognatus* (N. E. Brown). Plentiful between Wellington College and Sandhurst.—*Epilobium obscurum* × *roseum*. With the parents, on a bank near the river, about a mile and a half below Blackwater village. — *Hieracium rigidum* Hartm. var. *acrifolium* Dahlst. Near Blackwater, less plentiful than var. *scabrescens* Johanss.—*Thymus Chamædrys* Fr. Common.—*Sparganium ramosum* Curt. var. *microcarpum* Neuman. Pond at R. M. College. — *Carex elongata* L. Swamp near the river, about a mile and a half below Blackwater, with *C. vesicaria* L. My present colleague, Rev. C. B. de Jersey, tells me that he has found Coral-root (*Cardamine bulbifera* Br.) in Bisham parish—a good patch, in fine flower. This is an important addition to the county list.—Edward S. Marshall.

Physcomitrium sphæricum in Surrey. — This interesting little moss was originally found in Britain by Wilson at Mere Mere, Cheshire, in 1834, and has since appeared in a few other localities, from which, however, it is said to disappear for many years. This was the case at Mere Mere, where Mr. Hunt refound it in 1868. Mr. Dixon, in his Handbook, adds Derbyshire and Staffordshire. Its range is now considerably extended by its observation so far south as Surrey. It was found last December on the muddy shores of a large pond near Felbridge, in the S.E. or Eden district of the county, and when detected by Mr. Holmes—the first of a small party who saw it—was in excellent condition and growing in some abundance. Another interesting addition to my list of Surrey mosses was *Weisia rostellata* Ldb., which Mr. Horrell and I found the following day on the bottom of a drained pond near Dormans. —H. W. Monington.

Chenopodium capitatum Aschers. — This plant, more commonly known by the Linnean name *Blitum virgatum*, was found by me at Craig-y-don, Llandudno, not far from the Little Ormeshead, in September last, growing very locally, yet plentifully, in a patch of waste land. It has from time to time been recorded as a casual in the British Islands, *e. g.* by Mr. Alexander Irvine (Phyt. iii. n. s. p. 366) as occurring at Wandsworth; while Mr. F. J. Hanbury informs me he has a specimen collected by Dr. Boswell (Syme) at Fisherrow, near Edinburgh. It is figured by Curtis, Bot. Mag. t. 276, and used formerly to be cultivated for ornament, the round scarlet axillary bunches of fruit being conspicuous, and suggesting the popular name "Strawberry Blite."—James Cosmo Melvill.

NOTICES OF BOOKS.

History of European Botanical Discoveries in China. By E. Bretschneider, M.D. London: Low, Marston & Co. 2 vols. large 8vo, pp. 1167. Price 30s. net.

In this handsome work Dr. Bretschneider has brought together what is practically all the information available as to the history and progress of European knowledge of Chinese plants. For nearly thirty years he has been engaged in researches into the history of Chinese botany as recorded in ancient native botanical works and by early European travellers, and now he brings his labours up to date with this very exhaustive book, in which the history is brought down to the present day, and the investigations of living workers are duly recorded. Dr. Bretschneider had intended to delay until the *Index Floræ Sinensis* had been brought to a conclusion; "but," he says, "we cannot afford to wait any longer, for it is not to be foreseen when Mr. Hemsley's admirable work, interrupted more than four years ago, will be brought to an end." It must be confessed that Dr. Bretschneider has not overstated his case, for the more or less regular publication of the *Index* stopped in 1891, only one small instalment of about fifty pages having appeared since July of that year. Now that the Flora of Tropical Africa and the Cape Flora have at last been taken up, it is to be hoped in the interests of science that the Kew authorities who have the work in hand will not allow the Chinese Flora to fall into abeyance for an indefinite period.

Dr. Bretschneider divides his history into five periods:—i. The Pre-Linnean period (from the Middle Ages down to about the middle of the eighteenth century); ii. The Linnean period, extending to 1793; iii. The period from 1793 to the first war between England and China in 1840; iv. from 1840 to 1860; v. from 1860 to the present time. Each of these periods is divided and subdivided, always with much care and judgment, into numerous sections, which considerations of space will not allow us to enumerate. It must suffice to say that the author passes in review the work of all those who have either described or collected Chinese plants, enumerating the species and giving full reference to the place where each is described: of both writers and collectors he gives a biographical sketch and an account of their work, as it affects China, with indications of anything bearing even indirectly upon the subject. There are two admirable indexes, one of the persons mentioned, the other of the plants; the book is well and carefully printed, and may stand as a model for publications of its class.

We are glad to note that the pages of this Journal are frequently laid under contribution, and we propose to give here one or two items of information which to a small extent supplement Dr. Bretschneider's account. For example, we note (pp. 251, 257) a reference to a collection of Chinese drawings executed for John Reeves as "still existing in the Hort. Soc. library." In this

Journal for 1894 (p. 298) we stated that these drawings could not then be found at the Horticultural Society's rooms, nor have they been discovered during the recent cataloguing of the Lindley Library; and there is little doubt that these form, as is suggested in Journ. Bot. 1897, p. 427, the collection now in the Botanical Department of the British Museum, to which Dr. Bretschneider refers on p. 258. We think, by the way, that the learned author somewhat over-estimates the number of specimens from Reeves to be found in the Museum and Kew herbaria.

The collection of drawings formed by John Bradby (not "Bradley") Blake merits more attention than might appear from Dr. Bretschneider's reference (p. 152). It is described by Dryander (Cat. Bibl. Banks, iii. 183) as "Volumen continens icones plantarum 62, Cantoni eleganter pictas, cum anatome partium fructificationis." Dryander (Trans. Linn. Soc. i. 172) says that the Chinese artist had been instructed by Blake "in the art of making botanical drawings"; but this instruction was no doubt limited to the botanical details, as the figures are the work of an accomplished draughtsman. The volume contains MS. lists of determinations (none of them complete) by Banks, Solander, Dryander, and J. J. Bennett. In some cases—e.g. *Polygonum tinctorium*—the drawings are correlated by Dryander with specimens in Herb. Banks which bear the same native name in the same hand: in this particular instance the specimen and drawing form the type of the description in Hort. Kew. (ii. 33), although, as Dr. Bretschneider points out, the date 1776 is a mistake, as Blake died in 1773.

Another collection of Chinese drawings in the Botanical Department might interest Dr. Bretschneider, although the plants are drawn in a conventional and unpleasing manner. It is mentioned under "Anon." in Dryander's Catalogue of the Banksian Library (i. 252), but no light is thrown upon its history. The title-page of each of the two oblong folio volumes (each containing 100 plates) bears the inscription "Le Chr de Robier, Canton en Chine, année 1776." The plants are named in Chinese. Dryander enters another collection (*l. c.* iii. 183) as "Codex foliorum 96, quorum singula continent iconem plantæ, coloribus fucatim a pictore quodam sinensi" (quarto), but this does not seem to be in the Botanical Department.

Our author has not identified the "Robertson" mentioned on p. 154 with the James Robertson of the *Biographical Index*, which, it is pleasant to note, has been of much use to him in his researches. Nor is this to be wondered at, for when the *Index* was compiled we were not aware that the pupil of John Hope in Edinburgh who found *Eriocaulon* in Skye in 1768 was the Robertson who was subsequently sent through the influence of Banks to Calcutta, where (it would appear from an interesting letter in the Banksian correspondence written from Calcutta, 20 Feb. 1776) he subsequently obtained employment in the East India Company's service.

On his way to Calcutta he collected at St. Jago, Bombay, Madras, and Johanna Island, and sent plants from all these places

to Banks, which are now in Herb. Mus. Brit.—there are some from Johanna, although in his letter Robertson speaks of having had the misfortune to lose the (about 200) specimens he gathered in that island, "and was very near being drowned myself." I do not know under what circumstances he collected at Whampoa, but it was before the date above mentioned, for his specimen of *Adina globiflora* is labelled in Herb. Banks "Wampo, Mr. Robertson: gathered Novemb. 1772."

Dr. Bretschneider does not seem acquainted with the short paper "De Plantis Sinensium, ad confinia Siberiore australis nuper observatis" contributed by J. F. Henckel in 1732 to Act. Acad. Nat. Cur. iii. 354–356. This is a list of twenty-six plants, seeds of which were brought to him by his friend Johannes Godofredus Heydenreich, who collected them "in Chinæ confinibus." But the mention of so small an omission as this is in itself a tribute to the wonderful completeness of the work.

The number of typographical errors is astonishingly few: nor do we find anything of moment in the text which calls for correction. An inspection of Solander's MSS. shows that Martyn was right in saying that *Bradleia* was dedicated by Banks to Richard Bradley, so that Dr. Bretschneider's suggested substitution (p. 154) of Henry Bradley falls to the ground. The dates of death—10 Nov. 1896 and 14 June, 1894, respectively—may be added to the notices of Alfred Chandler and W. Wykeham Perry; and additional information as to John Potts and J. D. Parks will probably be found in their journals, which are in the possession of the Royal Horticultural Society.

JAMES BRITTEN.

LEGRÉ (Ludovic). *La Botanique en Provence au XVI^e Siècle; Pierre Pena et Mathias de Lobel.* Marseille (Barlatier), 1899 [*i. e.* 1898]. 8vo, pp. viii, 263.

THIS well-printed volume is in reality a careful and minute analysis of the *Stirpium Adversaria* of the two authors named in the title. Other volumes are referred to, but always for the light they shed on the subjects treated of in the *Adversaria*: even later works by Lobel himself are barely mentioned, the *Kruydtboek* once only in a passing mention, and the final issue of the *Adversaria* itself in 1605 is passed over in silence.

The field of discussion being thus narrowed, the survey of it is very thorough. The volume contains three main divisions:—I. Le *Stirpium Adversaria*, 59 pages; II. Herborisations en Provence, 85 pages; and III. Herborisations en Languedoc, 95 pages; the triple index brings the whole to a conclusion.

To English readers the first portion will be by far the most interesting; the author here handles the topic of the relative share of the co-authors in their joint production. It further has the novelty of introducing to us a man whose personality has been completely overshadowed by his partner in the work. Even MM. Planchon, in their well-known *Rondelet et ses disciples*, speak of the strange mystery enveloping the work of Pena, at one and the same

time celebrated and obscure, only known in conjunction with Lobel, the dates of his birth and death, his birthplace, and details of his life a sealed letter; a citation from the register of Montpellier University and an obscure hint giving us no real knowledge of the man. The conspicuous merit of the volume under review is the flood of light thrown on this hitherto unknown personage and his life.

When Morren's *Mathias de L'Obel, sa vie et son œuvre* was reviewed in this Journal (1876, 314–315), we regretted that so many statements were given without reference to the authority for them. Here, every statement is supported by an extract, with the actual reference; consequently we not only feel confidence in the good faith of the author, but we are able ourselves to check his statements, and are not dependent entirely on his judgment.

Pierre Pena was born at Jouques, a small town in the arrondissement of Aix, in Provence; the year of his birth is unknown, but he was, as we shall see, several years older than Lobel, who was born in 1538. He was the youngest of three brothers—André, who became "Conseiller au Parlement d'Aix"; Jean, a mathematician and professor at the College of France; and Pierre, who was intended for a soldier. When twenty years old, he was taken by his brother Jean to Paris to study medicine, and supported by him during his residence in the capital. After leaving Paris, Pierre visited the northern provinces of France, Flanders, Germany, the Tyrol, Switzerland, Italy, Piedmont, Spain, and Portugal, citing them as given by M. Legré. He was at Antwerp in 1558, Italy in 1560–64; in 1562 a second time at Padua, in 1563 making an excursion to Verona; in 1564 at Zürich with Conrad Gesner, thence he travelled to Venice; the next year, 1565, he met Lobel at Montpellier, having signed the register there in April, a few weeks earlier than Lobel.

Their stay at the southern University was but short, contrary to the received belief—a year and a half at the outside. We find them botanizing with the students in June, 1566; their teacher, Rondelet, died on 30th July of the same year, and in October they were both at La Rochelle on their way to England. Why was their stay in Montpellier so short? It is suggested that the death of their teacher was a determining cause; another that the muttering of the storm which broke out in 1567 was already marked by them, that, being probably both of them Protestants, they turned to the realm of England, where, under Elizabeth's sway, profound peace reigned. Be that as it may, they travelled by way of Agen, Bordeaux, Saintes, and Normandy, reaching our shores before the end of the year.

How the next three or four years were passed we have only slight indications. They seem to have been well received, and, as shown in their *Adversaria*, travelled about the country; by the end of 1570 their volume was printed, the preface being dated 24th December, and the printer's note 1st January, 1571.

What was the relative share borne by these two friends in the work thus produced? M. Legré unhesitatingly says Pena did the most, and on the following grounds :—

The plural is used throughout, except in four instances, when the first person singular slips in, when speaking of Spain and Portugal. Now, it has never been claimed for Lobel that he ever visited the Iberian peninsula; it is tolerably certain, therefore, that in these cases Pena is the author. Again, the intimate knowledge of southern plants, places, and native names could hardly have been acquired by Lobel, a Fleming, in a period of less than eighteen months, whilst Pena, born in country, would naturally be familiar with them; an additional corroboration is the use of "nostras" as applied to Provençal plants, which Lobel, from Lisle, in Flanders, would not have been likely to use.

Lobel was thirty-two years old when the *Adversaria* came out, yet the phrase "multis abhinc annis" occurs more than once; a conversation with Gesner is cited; we do not know that Lobel ever was at Zürich, while Pena was, a short time before Gesner died. Next the authority of authors who were contemporaries is cited: Garidel, Dalechamp, Gohory, all speak of Pena's *Adversaria*. Caspar Bauhin, who was on excellent terms with Lobel, and had also studied at Montpellier, joins in the same story.

The last argument which may be brought in is from the style of the book; Pena was bred to arms till he was twenty, and then, changing his profession, he would have but little time to acquire the graces of a correct style: hence the harshness of the text; Lobel's own language is less open to reproach.

Why, then, were the two names associated in the title-page? Lobel was of a vain nature, and would not have acquiesced in his own name standing second, out of alphabetic order, unless his part was really subordinate. The conclusion probably is that the idea of the work and most of the text is Pena's; that he had more slender means than Lobel, so the joint issue was the result. This will be noticed again.

Pena remained in England till 1572 at least, as a passage cited by the author shows; Lobel remained with us till his death in 1616 at Highgate. Pena's after career was a prosperous one; he left England for Antwerp, finally settled in France, attained great reputation in syphilitic affections, cured Henry III. of some disorder of that character, and died worth "600,000 livres," the year not being known.

Here we have a key to the mystery why Pena disappears botanically after the production of the *Adversaria*. The bulk of the book remained with the printer till Lobel produced his supplementary work, his *Stirpium Observationes*, in 1576, with the *Adversaria* appended, the introductory matter being modified. M. Max Rooses, curator of the Musée Plantin, states that that celebrated printer Plantin bought 800 copies, paying 1200 florins for them. This did not exhaust the stock, for Purfoot's reissue of the *Adversaria*, with other additions by Lobel, came out in 1605; it was not a reprint, as may be seen by certain accidents in the type.

These later issues have not been attentively examined by the author under review, or he would hardly have charged Lobel with

the offence of deliberately ousting Pena's name from their joint production. M. Legré says the supersession was done gradually. Thus the epistle to the Queen was signed only by Lobel, and he further mystifies the public by the form of the title and the index, "In Stirpium Observationes et Adversaria Mathias de Lobel index copiosissimus." The author here exclaims: "The trick is played; he has succeeded; Lobel has gained possession in the eyes of posterity." This language is too strong for the actual fact, for in the title-page of the 1605 complete volume we find: "Delucidae simplicium medicamentorum explicationes, & Stirpium Adversaria . . . . authoribus Petro Pena & Matthia De l'Obel, medicis . . . . quibus accessit altera pars . . . opera & studio Matthia de L'Obel" (note the variation in Lobel's own name). The index of the *Adversaria* is *identical with the original*, and especially curious in the heading, "In Stirpium Adversaria Matthiæ de Lobel & Petri Penae Index." This shows the danger of building too much on slight foundations.

Although we have not been able to follow our author in this matter as far as he would lead us, yet on the whole he has made out a strong case for his view of the matter; we have to thank him for his exertions in the cause of Pena, both natives of the same district. Our author is naturally disposed to take a favourable view of his fellow-countryman, just as M. Ed. Morren was equally naturally predisposed in favour of his own compatriot.

The space we have given to the above statement precludes our mentioning the remainder of the work in similar detail; besides, it appeals more particularly to those who concern themselves with the local botany of the old "Narbonaise." We must mention, however, one or two points of interest: thus, with regard to the "Paysage de la Craie," near Arles, the authors of the *Adversaria* translate the vernacular into "Creta" (*Phalangium cretæ salonensis* = *Asphodelus fistulosus* Linn.); our countryman Johnson in his turn further translated it into "Candy," as Crete was then termed in English, when treating of this plant in his edition of Gerard's *Herball*, p. 49; the mistake does not exist in the corresponding entry in the original, as may be seen by comparing the two entries (Gerard, *Herball*, 1597, p. 45).

A reader of the *Adversaria* must be struck with the frequency of "Norbona" and "Norbonensis" in place of the correct appellation; it seems that the London printers misread the word, and it passed uncorrected by the authors at a time when spelling was uncertain, or carelessly employed.

The mountain L'Aigoual was locally the "Ort de Dieu" or "Hort-de-Diou," rendered in French by "Jardin de Dieu," and latinized by our authors variously as "Hortus Dei," "Dei viridarium," and "Dei paradisus." It was a noted place for rare plants, but is now greatly altered for the worse by the waste of the forest-vegetation (déboisement). *Nardus gangitis*, &c., is not Indian, but derived from a small town, Ganges, not far from Montpellier.

We should have been better pleased had the three indexes, of

names of persons, places, and modern scientific names, been combined into one alphabet, and the *Adversaria* synonyms included; but this is almost the only word of fault-finding we feel disposed to utter. We close the volume with a feeling of gratitude to the author for much that is novel, not only in the actual facts brought together, but in the new light shed on old familiar things. The satisfactory accomplishment of this must have entailed an amount of labour incredible to any who have not themselves taken part in similar work. M. Legré says that this is an instalment of work on the flora of the south; when we next meet with him, may we find him equally interesting.

B. Daydon Jackson.

Grundziige der geographisch-morphologischen Methode der Pflanzensystematik. Von Dr. R. v. Wettstein. 8vo, pp. 64, 7 maps, 4 figs. Jena: G. Fischer. 1898. Price 4 marks.

Dr. Wettstein's essay consists of four chapters. In the first he discusses the present-day problems of systematic botany and the attempts which have hitherto been made to answer them. On the one hand, it has to supply a clear and concise review of all known plants; on the other, to give an idea of their phylogeny. The older school of botanists were occupied merely with the former task; a newer school, often with a contempt for earlier work, goes to the other extreme, and loses itself in theoretical speculation on affinities. Most systematists will agree with Dr. Wettstein's dicta that (1) a complete phylogenetic system is impossible, and we must be satisfied if our system represents as far as possible views on phylogeny; (2) only well-founded evolutionary considerations must be employed in systematic work. Such considerations, however, though useful in indicating affinities between the great groups of plants, are entirely at fault when we descend to genera and species, and we need here some other criterion. Such a one the author claims to have established. But, before elaborating the new method, he dilates (in Chapter II.) on the inadequacy of morphological (including anatomical) comparison for a natural system. He cites as an instance the season-dimorphism demonstrated by himself in species of *Gentiana* and *Euphrasia*, and by Sterneck in *Alectorolophus*, where early and late flowering forms of the same species are characterised by marked differences in the form of the leaf and the development of the stem. In Chapter III., after pointing out the uselessness of paleontology and ontogeny in working with species, he expounds his objective method, which gives the title to his essay, the geographic-morphological; and in Chapter IV. gives examples of its working in the genera *Gentiana* and *Euphrasia*.

In the words of the author, the application of the geographic-morphological method to the systematic arrangement of a polymorphic group of species is as follows. The first task is the setting down with as little confusion as possible the forms to be observed, the separation by means of experiment and observation in free life of varieties caused directly by external influences and not hereditary, the separation of unimportant hereditary forms due to subordinate

individual variations, and the determination of the geographical distribution of single forms by means of the largest possible amount of material. A morphological comparison of the discriminated forms will immediately lead to the recognition of certain indubitable groups. The general distribution of these groups, and the mutual relation and character of the areas occupied by the forms, will, in many cases, lead to natural views on the genetic relations of these forms, and their systematic value. The experiments thus made with different groups of species will correct and control each other.

One of the examples is supplied by the European species of *Gentiana*, Section *Endotricha*. The first map shows by lines of different form and colour the range of all the fourteen species, and, as Dr. Wettstein remarks, is as confused and useless as are generally maps in monographs; when, however, the fourteen species are spread over three maps (Nos. 2–4), order reigns in place of confusion. By devoting a map to each set of species with adjoining but distinct distribution areas, he obtains several geographically distinct sets. As the members of each set have common morphological characteristics, they are reduced to a group of subspecies of one species which is adjudged the type. The result is that the whole section comprises, in Dr. Wettstein's view, six species with twenty-two subspecies. In the working out of these examples the author displays considerable ingenuity, but one would like to have seen an instance dealt with where the distribution of the same or nearly-allied species is strikingly discontinuous. The geographic-morphological method, moreover, demands considerable knowledge of the factors of distribution, both present and past, as well as accurate information on distribution areas at the present time. In fact, we fear it would be quite impracticable outside a comparatively well-worked province such as Europe. Be that as it may, Dr. Wettstein's essay is a suggestive one, and will call attention to the importance of geographical distribution as a not-to-be-neglected quantity in taxonomic problems.

A. B. R.

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*ARTICLES IN JOURNALS.**

Bot. Centralblatt (No. 1). — F. W. Neger, *Arnica alpina* in S. America. — P. Magnus, 'Ueber die von O. Kuntze vorgenommenen Aenderungen der Namen einiger Uredineen-Gattungen.'— E. Heinricher, 'Die *Lathræa*-Arten Japans.' — (No. 2). N. C. Kindberg, 'Über die systematik der pleurocarpischen Laubmoose.' —(Nos. 2–4). G. Kükenthal, '*Carex orthostachys* und ihr Verwandtschaftskreis.' — (Nos. 3, 4). G. Bode, 'Zur Reindarstellung des Chlorophylls.' — F. Höck, '*Centrospermæ* und *Polygonales* des norddeutschen Tieflandes.'

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

Bot. Gazette (22 Dec.). — F. L. Stevens, 'Effect of aqueous solutions on germination of fungus spores.'—R. H. True, 'Physiological action of certain plasmolyzing agents.' — F. A. Waugh, 'Early botanical views of [concerning] *Prunus domestica*.'

Botaniska Notiser (häft 6: 9 Dec.). — S. Murbeck, 'Der nordeuropeiska formerna af slägtet *Cerastium*.' — S. Almquist, 'Om *Agrostis scabra* och *perennans*.'

Bull. de l'Herb. Boissier (26 Dec.). — R. Schlechter, 'Monographie der Disperideæ' (concl.). — H. Christ, 'Fougères de Mengtze, Chine.' — Id., 'Fougères de l'Amazone.' — J. Freyn, 'Bemerkenswerthe orientalische Pflanzenarten.'

Bull. Torrey Bot. Club (Dec. 16). — B. D. Gilbert, 'Revision of Bermuda Ferns.'* — J. K. Small, 'Botany of Southeastern U. S.' —B. D. Halsted, 'Exposure and fungous diseases.'—R. A. Heller, 'Plants from Western N. America.' — L. M. Underwood, 'Two recently named genera of Basidiomycetes.' — H. E. Hasse, 'New lichens from S. California.'

Erythea (5 Jan.).—T. S. Brandegee, 'New plants from Mexico.'

Gardeners' Chronicle (14 Jan.). — *Pelargonium crithmifolium* (fig. 5).—(21 Jan.). J. Lowrie, 'Seeding of *Bambusa arundinacea*.'

Journal de Botanique ('16 Nov.,' received 30 Dec.). — E. G. Camus, 'Plantes hybrides de la flore européenne' (cont.). — A. Finet, 'Orchidées nouvelles ou peu connues' (2 pl.). — P. van Tieghem, 'Avicenniacées et Symphorémacées.' — ('1–16 Dec.,' received 16 Jan.). — P. Guérin, 'Structure particulière du fruit de quelques Graminées.'—M. Goldflus, 'Assise épithéliale et antipodes des Composées.'

Oesterr. Bot. Zeitschrift (Jan.). — W. Schmidle, 'Vier neue Süsswasseralgen.' — J. Kerner, '*Gentiana verna* & *G. æstiva*.' — R. Schlechter, 'Revision der Gattung *Holothrix*' (concl.).

Pharmaceutical Journal (21 Jan.).—E. M. Holmes, 'West Indian Sandal-wood Oil' (*Schimmelia*, gen. nov.: Rutaceæ).

BOOK-NOTES, NEWS, &c.

The Rev. C. Casey, the author of *Riviera Nature Notes*, has no need to veil his identity under initials, for he has produced an extremely interesting and suggestive book. It is described in the subtitle as "a popular account of the more striking plants and animals of the Riviera and the Maritime Alps," and is a chatty account by a careful observer of the many delightful things he has seen during "as many as twelve summers in the villages of the Maritime

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* It may be worth noting that the earliest list of Bermudan Ferns—that by the Rev. R. Hunter in this Journal for 1877, p. 367—is not mentioned by Mr. Gilbert. The ferns were collected in 1843 and 1844, not in 1863 and 1864, as stated in the paper.—Ed. Journ. Bot.

Alps" and an intimate acquaintance with "the sheltered coast which he has known since 1859. He talks about plants and their names, their uses, their legends and associations—always with intelligence and in a pleasant readable way; and a good many amusing anecdotes diversify the narrative. The illustrations, with the exception of those which represent some of the delights of Mr. Thomas Hanbury's garden at La Mortola, do not add to the attractiveness of the volume, but this might be said of many books nowadays. We do not always agree with the author in his explanation of plant-names. For example, he supports "beadstraw" instead of "bedstraw," by saying that "a pious peasant who had no rosary to hand might find the *Galium* useful" as a substitute; but we can assure him that as such it would be entirely useless. Books like this may not add much to definite scientific knowledge, but they fulfil a useful purpose by encouraging that faculty of observation on which science so largely depends.

M. Le Jolis has published in no. 21 of the *Journal de Botanique* for 1898, and issued as a separate tract, a "Protestation contre le *Revisio generum plantarum* III.$^{ii.}$," in which he indignantly replies to the free criticism Dr. Kuntze has indulged himself in with reference to his treatment of the nomenclature of Algæ. The paper is too full of personalities to be altogether agreeable reading, but there appears to have been provocation. Some of the contentions have arisen out of the worship which most modern foreigners render to the assumed eternal value of the trivial part of specific names without regard (except generally as to gender) to the dominant or generic part. The article in the *Revisio* on *Trifolium charlatanicum* O. K., constituted as a facetious creation, with the varieties *α levierianum*, *β lejolisianum*, and *γ aschersonianum* as the types, may be a scientific pleasantry, but it is calculated to be unilateral in its pleasantness, and has obviously given keen offence to the botanist in whose honour the second variety was ironically named. In quoting the *Revisio* III.$^{ii.}$ some confusion occurs (as was likely) in consequence of two series of pages being each numbered in arabic numerals.

We have received the first number of *Rhodora*, the Journal of the New England Botanical Club, of which Mr. B. L. Robinson is "editor-in-chief." The number contains a monograph of New England *Goodyera*—a name which we are glad to see retained in preference to *Peramium* of Salisbury, which, although earlier, is a *nomen nudum;* numerous notes on various groups of plants; and a description and figure of a new *Lactuca—L. Morssii* Robinson. We wish the new venture every success.

The first part of the *Archives de l'Institut Botanique* of the Liège University (Brussels, 112, Rue de Louvain) is mainly devoted to the anatomy of the *Ranunculaceæ*, in which Dr. Lenfant deals with the genus *Delphinium*, Dr. Mansion with *Thalictrum*, and Dr. Sterckx with the *Clematideæ*, especially with *Clematis Vitalba*. Each memoir is illustrated with numerous plates. Dr. Gravis, who edits the *Archives*, contributes some "notes de technique micrographique."

Dr. Dyer has been appointed K.C.M.G., "in recognition of services rendered to colonial governments." The *Gardeners' Chronicle* notes that "the honour is timely and appropriate, as it coincides with the completion of the great temperate house in the Royal Gardens."

The Geographical Society of Lisbon has published a *Flora de Goa e Savantadi* by Dr. D. G. Dalgado, "catalogo methodico das plantas medicinass, alimentares e industriaes." There are no descriptions, but the useful properties of each species are briefly indicated.

Any addition to our knowledge of the flora of the Argentine Republic is welcome, but it is not easy to see what purpose will be served by the very crude coloured lithographs by F. Burmeister which form the most prominent feature of a new *Flora Argentina*, of which the first part has lately been issued by Messrs. Van Woerden, of Buenos Ayres. Each plate is accompanied by a page of descriptive letterpress in Spanish by C. Bettefreund, who edits the work, and there is a short introduction on collecting and preserving. There is no attempt at systematic arrangement. We fear that the laudable object of the editor to encourage "en la juventud argentina el interés y el amor por la Flora du su patria" will hardly be greatly advanced by this publication.

The second part of Mr. Fryer's Monograph of British Potamogetons contains descriptions of two species—*P. alpinum* and *P. Griffithii*—and two hybrids—*P. Billupsii* and *P. Drucei*—the last being the very interesting plant recorded by Mr. Druce in his Berkshire Flora as *P. alpinus*. In the "additions and corrections" to his book, Mr. Druce notes "put ? to *P. fluitans*," and expresses an opinion that the plant is "a hybrid either of *P. natans* or *P. polygonifolius* with *P. alpinus*," and Mr. Fryer confirms this view so far as *P. natans* is concerned. We mention this because when speaking of Mr. Druce's plant in this Journal for 1898 (p. 355) we omitted to notice his later qualification of the definite statement as to the occurrence of *P. alpinus* in Berkshire. Mr. Morgan's plates in this number are, as always, excellent: the publishers, we regret to see, still make them inconvenient for reference by placing their name where we should expect to find that of the plant.

The *Gardeners' Magazine* of Jan. 14 has a biographical sketch of Mr. Hemsley, accompanied by an excellent portrait. The writer says: "The history of his life, with its many interesting associations, appears 'like a tale that is told,' and one is fully persuaded that there are Whittingtons even at the end of the nineteenth century." We trust that several chapters remain to be added before "the tale" of Mr. Hemsley's life "is told."

The last instalment of Prof. Saccardo's *Sylloge Fungorum* consists of an "Index universalis et locupletissimus nominum plantarum hospitum specierumque omnium fungorum has incolentium quæ usque ad finem anni 1897 innotuerunt," compiled by Dr. Sydow.

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CONTENTS.

PAGE

A Review of the Latin Terms used in Botany to denote Colour. By B. DAYDON JACKSON, Sec.L.S. .. 97

The Alga-Flora of Cambridgeshire. By G. S. WEST, B.A., A.R.C.S. (Plate 395) (continued) 106

Critical Notes on some Species of *Cerastium*. By FREDERIC N. WILLIAMS, F.L.S. (continued) 116

Botanical Excursions in Donegal, 1898. By H. C. HART, P.L.S., &c. (continued) 125

Lamium molle Ait. By JAS. BRITTEN, F.L.S. 130

Carnarvonshire Mosses. By H. N. DIXON, M.A., F.L.S. 132

PAGE

Report of Department of Botany, British Museum, 1897. By GEO. MURRAY, F.R.S. 134

SHORT NOTES. — *Psamma baltica* Roem. & Schult.—Note on Chinese Plants. — *Primula scotica* Hook.— Sussex Plants.— *Rubus Kaltenbachii* in Leicestershire .. 135

NOTICES OF BOOKS:—

Living Plants and their Properties. By J. C. ARTHUR, Sc.D., and D. T. MACDOUGAL, Ph.D.— Plant Life considered with special reference to Form and Function. By C. R. BARNES.— Gesammelte Botanische Mittheilungen von S. SCHWENDENER 137

Articles in Journals 139

Book-Notes, News, &c. 140

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A REVIEW OF THE LATIN TERMS USED IN BOTANY TO DENOTE COLOUR.

By B. Daydon Jackson, Sec.L.S.

Recently I have had occasion to examine the various definitions of colours as given by botanic authors, and have been much surprised at the contradictory senses in which the same term has been employed. In this article I give a condensed account of the results of my researches, with a brief list of the chief works which have helped me.

Naturally my first idea was to take Saccardo's *Chromotaxia* as the standard, that being the latest work, and widely known; but difficulties arose. Thus, the selected terms are rarely defined; what serve as definitions are the polyglot translations, and therefore not critical; then the synonyms are not particularized, their differing quality being unexplained. Further, the kindred tints are seldom defined, so that widely diverse tones are grouped together as "Colores affines." Nor do the appended tables of colours supply all that is required; the colours shown do not embrace the whole scale, with the combinations of primary, secondary, and tertiary which go to make up the tints we have to describe, and in the selected examples many persons would disagree with the names assigned. For instance, the colour to exemplify *purpureus* is the crimson of artists.

A much more elaborate attempt at a complete scheme of notation for colour as regards naturalists is Ridgway's *Nomenclature*, but here again we find hindrances. The examples given are not equally graduated; some are very close to each other, others are widely separated. The names propounded are somewhat arbitrary, and therefore not likely to be adopted universally; consequently the terms coined by the author would not be understood, save by those who had access to the book itself. These objections seem to hold good more or less to every manual which has come under my observation.

If we turn to classical authors to try and get to the foundation, we are still worse confounded. Classical writers, mostly poets, have indulged in more than poetic licence in their allusion to colour. Then, too, our knowledge of their pigments and dyes is fragmentary; their choice of dye-stuffs was limited, and the resulting hues probably crude. The love of landscape, with its varying subtle effects of delicate light and shade and colour, was very little felt, only the more obvious and striking effects of tempest, sunrise, or sunset would attract attention; hence no terms would be needed to express what was unfelt. Lexicographers, having only this material to work upon, are equally uncritical in their definitions, and give us such stuff as "Miniatus, scarlet or crimson," "Gilvus, a carnation or flesh colour; the colour of bricks half burned; of an ash or ashen colour." The same

looseness prevails in common speech, where such exaggerated expressions as "red-haired" or "black in the face" pass current.

Without wasting time in endeavouring to ascertain the precise use of colour-terms during the period when Latin was in common use, I next tried to find out the actual usage of botanists. After spending much time on this quest, I have been forced to the conviction that great confusion actually exists as to the meaning of many of the words employed to connote colours. Botanists can and do give actual measurements of the specimens they describe, and the terms for form and structure are fairly well understood and employed, but when colour has to be expressed less care is shown. No colour-scale is used: guess-work is the rule. Colour-blindness, partial or complete, is responsible for some of this, no doubt, and the pre-occupation of a desired word may also conduce to the same result; thus, if *albus* is not available, *candidus* may be employed, without regard to the difference in quality implied in the two terms. Many words are really generic, not specific; purple, for instance, embraces nearly every conceivable admixture of red and blue; these again may be varied almost infinitely by dilution or the addition of white, forming "tints," or of black to form "shades." The resultant hues of the blending of so many secondary and tertiary with primary colours is to produce mixtures which an artist, whose business it is to handle colours constantly, would only attempt to describe by indicating the actual pigments needed. It is therefore too much to expect scientific nomenclature of colour from a naturalist, whose concern is naturally chiefly engrossed with questions of form and function.

In connection with this I may mention that I have found botanists who work chiefly from dried material trust very little to colour, while, as might be expected, the genera which are largely cultivated afford many indications of the colour of their flowers. The foregoing applies principally to flowering plants; among the cryptogams the fungi are often particularized by hue, and the most valuable help I have derived in this search has been from the late Mr. Wharton's paper in the Woolhope Club *Transactions*, in which he has summarized the whole of Fries's terms of colour in the Agarics.

I subjoin the gist of my enquiries, hoping that I have succeeded in indicating the central idea of each tint, and adding conspicuous contrasts of opinion; vague and unsatisfactory it must often be, from the impossibility of getting absolute unanimity on so many details which remain a matter of taste or perception.

In describing the various tints, a linear order must be observed; the mutual relationships of the hues form a plexus such as we often find sketched out by monographers to indicate genetic affinities. The arrangement is to some extent arbitrary, but following the spectrum as far as practicable. Grey and brown have been assigned sections on account of the numerous terms centering round them. Many compound terms exist, but only those which are often used are cited in this list.

Conspectus of the Sections.

I. Terms implying absence of colour.
II. White.
III. Grey (cold neutrals).
IV. Black.
V. Brown (warm neutrals).
VI. Red.
VII. Orange.
VIII. Yellow.
IX. Green.
X. Blue.
XI. Purple.
XII. Terms implying colour, without defining it; and vague terms.

I.—Amongst the terms expressive of absence of colour we find *hyalinus*, *vitreus*, *vitricus*, glassy (but used by Charleton, following classical usage, as a light green); *aqueus*, clear as water; *crystallinus*, clear as ice; *pellucidus*, also implying clearness; *semi-pellucidus*, some amount of opacity; *diaphanus*, transparent; *achroos* and *incolor* for scarious. Bischoff also adds *fenestratus*, but this use of the word is certainly very unusual.

II.—White is not a colour, but it produces a feeling of absolute tint, not the negative considered in the foregoing section. Beginning with the most general and characteristic of the words expressive of white, we have *albus*, a dead white; *niveus*, and occasionally *nivalis*, a brilliantly pure white (as in *Galeandra nivalis* Hort., from its snowy lip; being a native of the tropics, it cannot be ascribed to its habitat); *virgineus*, unblemished white; *papyraceus*, paper-white; *candidus* and *candidissimus*, shining white; then the four terms, *cretaceus*, *calcareus*, *creteus*, *gypseus*, seem synonymous, chalk-white; *cerussatus*, plaster-white or white-lead-coloured, must mean the same; *argillaceus*, white clay (but also used for a yellower tint). *Albidus*, *albidulus*, *albinus*, *albineus*, *albellus*, *candidulus*, *exalbidus*, all mean whitish, with probably but little to choose between them; milk-white, that is, having a suffusion of blue, is represented by *lacteus*, *lacticolor*, *galactites*, *galacticolor*, *galachrous*. Silvery white is *argenteus*, *argentaceus*, *argentatus*, *argyraceus*. Something short of absolute purity is suggested by *albicans*, *albescens*, *candicans*, becoming white; ivory-white by *eburneus* and *eborinus*; a yellower tinge by *ermineus*, *cremeus*, *cremicolor*, cream-coloured; and an ill-defined "marble-white" by *alabastrinus* and *marmoratus*, but the latter is used in another sense, and therefore ambiguous.

III.—The lightest tone of Grey is denoted by *canus* and *incanus*; *cinereus* is the grey of wood-ashes, with its allies, *cinerascens* (becoming grey), *cinericius*, *cineraceus*, *tephreus*, *tephrus*; *cretaceo-pallidus* seems to come here; *leucophæus* must be near this. *Griseus* is darker, but *griseolus* and *grisellus* are perhaps intermediate; *livicius*, darker than *griseus*, with a suspicion of brown. *Cæsius* and *cæsiellus* originally represent the blue-grey of the iris of the eye; *liveus*, *livius*, *lividus*, *lividulus*, duller, with less colour; *pavonianus* is also added by Charleton.

Spodochrous is grey in general. *Molybdus*, *molybdinus*, *plumbeus* are lead-coloured; about the same intensity with more sheen are *columbianus* and *palumbinus*, which, meaning dove-coloured, seem misappropriated by a grey pigeon. Darker still are *ardosiacus* and *schistaceus*, slate-coloured; while *tylicolor* and *oniscus* are the tints of the wood-louse, and *elephines* and *elephinus* the deep colour of an elephant's hide. *Chalybeus* and *subustulatus* stand for steel-grey; *murinus* and *myochrous* are mouse-coloured (Fries distinguishes between these, the former the lighter); *atro-schistaceus*, very dark grey; *fumosus*, *fumeus*, *fuligineus*, *fuliginosus*, *capnodes*, *capnoides*, *subfuscus*, *subaquilus*, represent smoky or sooty tints (Charleton adds *sepiaceus*, which should be ranked amongst the browns); *elbidus*, "saddest grey"; *nigrescens* and *nigricans* are greys which turn black.

Other terms which are too vague to be precisely localized are—*nebulosus* (Bischoff = *fumosus*); *ferreus*, "iron-gray,"—Charleton, who also renders "peach-colour" by *fulgens*, *fulgidus*, *splendens!*

IV.—Various qualities of Black have received distinct names; thus *ater* is pure black, without a trace of brown or blue in it; *atricolor* cannot be far off the same; *atramentarius*, inky; *niger*, glistening black, perhaps a trifle rusty; *nigerrimus*, intense black; *anthracinus*, coal-black; *piceus*, pitchy; *piceo-ater* and *furvus* are swarthy and lustreless; *atratus* and *nigritus*, garbed in black; *pullus* and *pullulatus*, about the same tint; *memnonius*, nearly the same as *piceus*, perhaps a little browner; *æthiopicus*, negro-black; *coracinus*, *corvinus*, metallic lustrous black with a tinge of blue; *nigellus*, blackish, and *denigratus*, blackened, are wanting in precision.

V.—Brown, a warm tertiary, is treated separately, because of the numerous varieties tending either towards the yellows or reds. *Brunneus* or *bruneus* is a general term for brown, but when restricted, represented by Vandyke brown as a pigment. *Chocolatinus*, *theobrominus*, and *cocainus*, which represent the same thing; *coffeatus*, the colour of roast coffee-beans; *tabacinus*, *nicotianus*, offer a wide range, but are practically restricted to a deep brown. Less precise are *brunnescens* and *bruneolus*, lighter tints. *Umbrinus* would seem to imply the colour of the native earth, but, as we are informed that it is deep brown, it probably is that of burnt umber; *umbricellus* seems ancillary; *bæticus*, "Spanish brown," must not be confused with the same adjective when used locally; *castaneus*, chestnut-brown, brings us towards *badius*, bay; *russus*, nearly the same; *helvus* and *vaccinus*, "cow-colour," said to be near bay; *hepaticus*, liver-coloured, redder; *hiberus*, "red and black mixed, murrey"; deeper tones being *atro-brunneus*, blackish brown; *ustalis* and *ustulatus*, scorched or charred wood. Lighter browns, akin to yellow, are *spadiceus*, date-brown; *avellaneus*, *avellinus*, *corylinus*, tint of a new hazel-nut, *glandulaceus*, a ripe acorn, come near the tawny shades named under orange, as also *ligno-brunneus*, *ligneus*, *lignicolor*, presumably the tint of recent wood before it becomes grey by exposure, hence yellowish brown.

VI.—*Ruber* embraces the various forms of Red as a whole: the purest being *carmineus*, cochineal; *coccineus*, perhaps identical; while *kermesinus* and *chermesinus* are the same, and *coccinellus* a lighter tint. *Phœniceus* is scarlet a little dull, *cinnabarinus* and *scarlatinus* being the fullest in hue; *miniatus*, *miniaceus*, the more orange-tint of red-lead. Verging towards crimson, that is, with blue instead of yellow as the tingeing colour, we have *sanguineus*, *sanguinolentus*, *cruentus*, *cruentatus*, *hæmatinus*, *hæmatites*, *hæmatitius*, *hæmatochroos*, and *hæmaticus*, all denoting blood-colour; *puniceus* is crimson; *burrhus*, deep crimson, passing into *xerampelinus*, *atro-carmesinus*, *atro-coccineus*, towards *rutilus*, *rutilans*, defined by some as purplish brick-red, but usually brighter in hue; *testaceus*, brick-red, which approaches *gilvus*, *figlinus*, terra cotta; *lateritius*, also brick-red; still deeper in tone, *vinaceus*, and *vinosus*, wine-colour. Rosy reds are *carneus*, *carneolus*, *incarnatus*, flesh-colour; *hysginus*, distinctly redder; *caryophyllaceus*, "pink"-colour; *erubescens*, blush; *roseus*, *rosaceus*, *rosellus*, *rhodellus*, rose; *corallinus*, coral-red; *salmonaceus*, *salmonicolor*, *salmoneus*, pink with a dash of yellow; *persicus*, *persicinus*, peach-flower colour.

Terms used laxly are *rubescens*, *rufescens*, *rufidulus*, *rufulus*, *rubicundus*, *rufus* or *ruffus*, *sandaricus*, *sandarichinus*, *robeus*, *robus*, *rubens*, *rubellus*, *rubeolus*, *rubidus*, *subrubicundus*, *subrubens*, *sublateritius*, *helvolus*, the last also used for a yellowish drab, but probably pale red, according to the mycological usage of the term; *russus* is also placed amongst the ill-defined reds by some.

VII.—Orange in its full glow is denoted by *aurantius*, and Fries uses *aurantiacus* as a lighter tint; *croceus*, *crocatus*, *crocinus*, rich orange; then we have a doubtful set of names, *igneus*, *ignescens*, *flammeus*, *flammeolus*, which have been applied to varied tints of orange, yellow, and red; *auroreus* perhaps should come here, but it is also vague. *Armeniacus*, dull orange, apricot-colour; *gilvus* by some ranked here, yellower than *cinnamomeus*; *crustulinus*, the colour of a cracknel biscuit; *isabellinus*, a dirtier tint; *rhabarbarinus*, rhubarb colour; *cupreus* and *cuprescens*, copper-coloured, sometimes with metallic lustre; *rubiginosus*, *ferrugineus* and *ferruginosus*, rusty; *nitelinus*, dormouse-colour, paler and less definite; *tofaceus* or *tophaceus*, the colour of tufa; *corneus*, "horn-colour," whatever that may be; and *argillaceus*, improperly used for a fawn-coloured clay.

The fulvous tints are given under yellow.

VIII.—The type of Yellow is *flavus*, without tending to orange or green or brown (sometimes indeed used for *ochraceus*); *flavissimus*, an intense shade, *flavicans*, *flavidus*, being tendencies towards *flavus*; *byssinus* is the yellow of raw silk; *citrinus*, *citreus*, *citrellus*, *citrinellus*, the pure yellow of the ripe lemon-rind; *luteus* is a full strong hue, used by Pliny to denote the yolk of egg, hence synonymous with *vitellinus*, having a tinge of orange in it. The Greek forms are *xanthus* and its diminutive *xanthellus*; *aureus*, *auricolor*, *chryseus*, *chrysellus*, *chrysitis*, express not only the tint but the lustre of gold; *auratus*, gilt; *aureolus*, golden; *luteolus* and *subflavus*, lighter and less pure (but scarcely buff, as given by Ridgway); *electricus* and

succineus, amber; *sulphureus*, *sulphurellus*, *sulphurinus*, sulphur-yellow, pure but light; *primulinus*, a shade greener than the last; *stramineus*, *straminellus*, *paleus*, straw-colour, like the last, but browner; *buxeus*, colour of box-wood; *cerinus*, beeswax when in the comb; *melleus*, *mellinus*, honey-colour, the former ambiguous, being also used for smelling of honey; *ochraceus*, *ochroleucus*, *lutosus*, ochre-colour, that is, yellow broken with a tinge of red.

Connected with the foregoing are many mixed tints, tertiaries, such as *fulvus*, buff, with its variants *fulvidus*, *fulvellus*, *fulvescens*; *leochromus*, *leoninus*, *cervinus*, *cervineus*, *cervicolor*, *camelinus*, *mustelinus*, taking their names from the prevalent hue of the lion, stag, camel, and weasel, varying buffs and drabs; *hinnuleus*, fawn-colour, tawny cinnamon. Stronger in tint, but impure, are *galbanus*, the colour of gum galbanum, greenish yellow, and *ictericus*, *icterinus*, the colour of a person suffering from jaundice. Wharton gives this as "gall-stone," but in error; gall-stone is a gorgeous full-toned yellow, while the name implies a muddy hue; he also cites Fries as using *luridus* for wan yellow, dirtier than *melleus*, and almost "stone-colour," that is, white broken with ochre, and sometimes umber. *Ravus* and its diminutive *ravidus* seem to be between yellow and grey.

IX.—Green is termed *viridis* without more critical definition, its synonyms, more or less accurate, being *virens*, *viridans*, *virescens*, *viridescens*, *viridulus*. Grass-green is *herbeus*, *herbaceus*, *gramineus* (these are practically obsolete); *prasinus* is leek-green, practically the same tint as the last; *smaragdinus*, emerald-green; *berylinus*, resembling the last; *psittaceus*, parrot-green, deeper; *orobitinus*, defined as vetch-green, that is, with a dash of black in it; *atrovirens*, *atroviridis*, *melanochlorus*, *nigro-virens*, very deep green; and *flavo-virens*, a bright yellowish green. *Chlorascens*, *chlorinus*, *chloroticus* are greenish.

Æneus is brassy; *æreus*, bronze; *ærugineus*, *ærugino*sus, verdigris-green; *saligneus*, willow-green, that is, low-toned; *subviridis* may be the same. *Olivascens*, *olivaceus*, *oliveus*, *olivicolor*, *olivinus*, *elæodes*, *pausiacus*, all express the tint of a ripe olive.

Glaucus, *glaucinus*, *glaucescens*, *thalassinus*, *thalassicus*, light sea-green, to which may be added *vitreus* of some authors; *aquamarinus*, a clear sea-green verging towards blue; and *venetus*, a deep sea-green.

Githaginosus (Hayne, Bischoff) and *githagineus* (Lindley) are defined as greenish red, a contradiction; the name is derived from *Githago*, and it refers to red or purple ribs on a green calyx, such as occurs in some species of *Silene*.

X.—Blue has a comparatively small list to express its varieties; *cæruleus*, *cælestis*, *azureus*, *cælicolor* are sky-blue; *cobaltinus* somewhat paler, as is *cærulescens*; *cyanellus*, deeper, and tending towards *cyaneus*, cornflower-blue, *cizatinus* being given as about the same; *lazulinus* is ultramarine, a pigment of various shades, but always a clear bright blue; *turcoisinus* and *turcosus* stand for turquoise-blue, that is, with a hint of green in it; *cæsius* and *cæsiellus* are the blue-grey of the eye; *subcæruleus* and *lividulus*, less clear, and not very

definite; *scyricum* is gived by Charleton as "Gentianella blew"; *glastinus*, by the same writer as "woad, watchet and light blew"; *indicus*, blue inclining to purple; *indigoticus*, indigo-blue, having a tinge of black in it; and dark blue, *cyanater*.

XI.—Purple is very variously understood; practically it is any mixture of blue and red; Saccardo treats it as synonymous with crimson, but the majority regard it as having more of blue in its composition. *Purpureus*, *porphyreus*, therefore, are general in their application, followed by *purpurascens*, *purpurellus*, *purpurinus*, and *porphyreo-leucus*; *atropurpureus* is familiar to most in the old cultivated "Sweet Scabious," *Scabiosa atropurpurea*. Royal purple, a warm deep rich tint, is represented by *ostrinus*, *tyrius*, *blatteus*. Charleton gives "*dibaphus*, purple-in-grain" as different. The previously mentioned *vinaceus*, *vinosus*, and *vinicolor* come near these hues. Of a lighter tint we find *molochinus* and *malvinus*, both expressing the bluish pink *Malva* flowers; *lilacinus*, *lilaceus*, *syringus* recall the tint of *Syringa vulgaris*. Colder in hue we have *violaceus*, *violascens*, *violeus*, *ianthinus*, *ionides* to recall the violet in all its shades, deeper tones denoted by *amethysteus*, *amethystinus*, *hyacinthinus*, and *atro-violaceus*.

Bischoff ranks *porphyreus* as amongst the browns; it seems erroneously.

XII.—Amongst the vague terms must be cited *igneus*, *ignescens*, *flammeus*, *flammeolus*, as they have been used to express different colours; *pallidus* has also been made use of for almost every pale tint of the artist's palette; *luridus* is nearly as indefinite; *tristis* and *sordidus*, any dull uninviting hue, *obscurus* being perhaps a truer term; *coruscans* must mean any strikingly brilliant colour or combination; *metallicus*, any glistening tint suggestive of a metal.

Fulmineus, "lightning-coloured," according to Wharton, is "fulvus, fere brunneus" of Fries; it is employed in *Cortinarius fulmineus* Fr.

Another subsection consists of terms implying colour, but abstaining from indicating it, such as *coloratus*, *concolor*, *bicolor*, *mutabilis*, *variegatus*, *pictus*, *guttatus*, *punctulatus*, and the like. *Marmoratus* has also its place here, although it has been used as synonymous with *alabastrinus*, etc.

I have purposely abstained from augmenting my list from the dictionaries, confining myself to those terms which are supposed to be adapted to the use of naturalists, especially botanists. Had I chosen to put in all the tints which are related to *helvus*, for instance, I must have given many more than seemed appropriate. Indeed the dictionary translation of *helvus* and its satellites is pale red, which is not its present day use.

There yet remain more than a score of terms proposed to express colour, which have not been adopted by others; as they seem to be on record only in the original place of publication (Hayne, De coloribus, 1814), I prefer to give them in a separate paragraph in the order chosen by the author, omitting the zoological and mineralogical terms.

Betulinus, the brownish white of birch-bark; *amiantus*, greenish-white; *cycaceus*, "sago-grey"; *roborinus*, the grey of last year's oak-twigs; *strychninus*, the colour of the seeds of *Strychnos Nux-vomica*; *foeninus*, "hay-grey"; *morinus*, mulberry-black; *ureaceus*, charred black; *cascarillus*, the colour of the inner bark of Cascarilla; *guajacinus*, greenish brown; *juniperinus*, bluish brown; *ranunculaceus*, buttercup yellow; *laureolaceus*, the tint of the flowers of *Daphne Laureola*; *pomaceus*, apple green; *pisaceus*, the green of unripe peas; *populeus*, the blackish green of poplar leaves; *capparinus*, brownish green; *endiviaceus*, light blue; *nubilus*, greyish blue; *myrtillinus*, bilberry blue; *pruninus*, plum blue; *parellinus*, litmus violet: *infumatus* is the same as *fumigatus*.

Bibliography.

I purposely abstain from including those works which deal with the subject from a purely artistic point of view, such as quality and pigments, contrast and harmony. The following appeal especially to naturalists:—

1. Charleton (Walter). Exercitationes de differentiis & nominibus animalium; quibus accedunt . . . differentiis & nominibus colorum. Ed. 2. Oxoniæ, 1677. Fol. Cf. pp. 66–73.

2. Hayne (Friedrich Gottlob). Termini botanici iconibus illustrati, etc. Berlin, 1807 [*i. e.* 1799–1812]. 2 vols. 4to.

   Vol. i. p. 7–9, t. 1, nn. 1–36. Small but excellent examples of the colours mentioned, which are described in parallel columns in Latin and German.

3. —— De coloribus corporum naturalium præcipue animalium vegetabiliumque, etc. Berolini, 1814. 4to.

   For an enumeration of the names here suggested, see last paragraph of text.

4. Candolle (Augustin Pyramus de). Théorie élémentaire de la botanique, etc. Paris, 1813. 8vo. — 'Modifications des couleurs,' p. 484–494.

   Practically the same account will be found in ed. 2 (1819, p. 519–528) and ed. 3 (1844, p. 429–436). These terms with condensed descriptions are given by Germain de St. Pierre in his 'Guide du botaniste' (1852), vol. ii. p. 495–6; and the second edition, re-entitled 'Nouveau dictionnaire de botanique' (1870), p. 337–8.

5. Syme (Patrick). Werner's Nomenclature of Colours, with additions arranged so as to render it highly useful to the Arts and Sciences, particularly Zoology, Botany, etc. Edinburgh, 1814. 8vo. Ed. 2, ib., 1821. 8vo.

   The purples in this work are very cold; possibly the combined reds have faded somewhat.

6. Mirbel (Charles François, *nommé* Brisseau). Tableaux chromatiques comprenant 83 teintes aux quelles toutes les couleurs peuvent être comparées. In his 'Elémens de physiologie végétale,' 1815. The last plate (t. 72); it has no explanatory text.

7. Sprengel (Kurt). Anleitung zur Kenntniss der Gewächse. Ed. 2. Halle, 1817–18. 2 vols. 8vo.
Von der Farbe der Blüthen, i. 147–156.

8. Hayter (George). Copy of a letter to his Grace the Duke of Bedford. Forms Appendix, p. 39–41, with diagrams of colours and plates of gradations from black to white and brown to white, in J. Forbes's 'Hortus ericæus Woburnensis.' London, 1825. 4to.

9. Bischoff (Gottlieb Wilhelm). Handbuch der botanischen Terminologie und Systemkunde. Nürnberg, 1830–44. 3 vols. 4to.
Vol. i. p. 107–115, contains a long list of terms, which will be found translated in Lindley's 'Introduction.'

10. Lindley (John). An Introduction to Botany. London, 1832. 8vo.
Of Colour, p. 402–408.—Ed. 2 (1835), the same, p. 403–409.—Ed. 4 (1848), the same, ii. p. 369–373.
Admittedly from Bischoff, whose arrangement is followed.

11. Henslow (John Stevens). The Principles of Descriptive and Physiological Botany (Lardner's Cyclop. vol. 75). London, 1835. 8vo.
On Vegetable Colours and Colours of Flowers, p. 195–201.

12. Hay (David Raymsay). A Nomenclature of Colours, etc. Edinburgh, 1845. 8vo. 40 coloured plates. Ed. 2, ib., 1846. 8vo.

13. Rood (Ogden Nicholas). Modern Chromatics, etc. (Intern. Sc. Ser. vol. 27). London, 1879. 8vo. *Reissued as* Student's Text-book of Colour, etc. (Intern. Science Ser. vol. 27). New York, 1881. 8vo.
(French and German versions respectively of 1881 and 1879).

14. Bezold (Wilhelm von). Die Farbenlehre im Hinblick auf Kunst, etc. Braunschweig, 1874. 8vo.
—— The Theory of Colour . . . translated by S. R. Koehler, with an introduction by E. C. Pickering, etc. Boston [Mass.], 1876. 8vo.
This has a bibliography from both physical and artistic points of view.

15. Du Port (James Mourant). On the Colours of Fungi as indicated by the Latin words used by Fries. Trans. Woolhope Club, 1883–85, p. 113–115.

16. Wharton (Henry Thornton). On Fries's Nomenclature of Colours: an examination of the epithets used by him in describing the coloration of the Agaricini. Trans. Woolhope Club, 1883–85, p. 252–257; repr. in Grevillea, xiii. (1884), 24–31.

17. Ridgway (Robert). A Nomenclature of Colors for Naturalists, etc. Boston [Mass.], 1886. 8vo.
With 9 coloured plates, of combinations with 184 tints; a valuable work.

18. Saccardo (Pier' Andrea). Chromotaxia, seu nomenclator colorum polyglottus additis speciminibus coloratis ad usum Botanicorum et Zoologorum. Patavii, 1891. 8vo.

19. Pillsbury (J. H.). On the colour descriptions of flowers. Coulter's Botanical Gazette, xix. (1894), 15–18.
With symbols for notation.

THE ALGA-FLORA OF CAMBRIDGESHIRE.

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(Plates 394–396.)

(Continued from p. 58.)

Fam. Confervaceæ.

42. Conferva bombycina Ag. 3. Sheep's Green, Cambridge; Harlton; Wimpole Park. 5. Burwell; Chippenham Fen. 6. Roswell Pits, Ely; Sutton. 8. Guyhirne.
Forma minor Wille. 3. Harlton. 5. Burwell; Wicken Fen.

43. C. affinis Kütz. 3. Sheep's Green, Cambridge: July, 1898.

44. Microspora floccosa (Vauch.) Thur. 3. Sheep's Green, Cambridge.

45. Ophiocytium cochleare (Eichw.) A. Br. 3. Sheep's Green, Cambridge; Harlton; Hardwick. 5. Burwell; Wicken Fen. 6. Roswell Pits, Ely. 7. Near March.

The removal of the genus *Ophiocytium* (inclusive of *Sciadium*) from the Protococcoideæ need hardly occasion any surprise, as its position in the subfamily Pseudocœnobieæ of that order was obviously one of convenience rather than of accuracy; a few remarks are necessary, however, concerning its present position. Quite recently, Knut Bohlin, in a most interesting paper entitled 'Studier öfver några slägten af Alggruppen Confervales' (Bih. till Sv. Vet.-Akad. Handl. 1897, Bd. 23, Afd. iii. no. 3), has conclusively demonstrated, by an exhaustive study of the structure of the cell-wall, the close affinity which exists between the genera *Ophiocytium* and *Conferva*. Many of the earlier stages in the development of *Ophiocytium* are also strictly comparable to correspondingly early stages in the development of *Conferva*; cfr. Knut Bohlin, *l. c.* t. ii. f. 47, 51, 52, 54–56; Wille, 'Om Hvilceller hos Conferva,' Ofvers. af K. Vet.-Akad. Förh. 1881, no. 8, t. ix. f. 15, 17, 18, 21–26. I also figure a few stages (Pl. 394, figs. 18-22) in the development of *Ophiocytium* which may be compared with the illustrations already mentioned.

46. O. parvulum (Perty) A. Br. 3. Wimpole Park. 5. Chippenham Fen. 8. Guyhirne.

47. O. Arbuscula (A. Br.) Rabenh. Syn. *Sciadium Arbuscula* A. Br. 3. Sheep's Green, Cambridge. 6. Roswell Pits, Ely.

I follow Rabenhorst (Flor. Europ. Algar. iii. 68) in the inclusion of *Sciadium* A. Br. in the genus *Ophiocytium*. The former consists merely of an aggregate of individuals of the latter genus, and in many cases the cells composing this aggregate are coiled quite as much as an individual *Ophiocytium*, a fact which still further increases the resemblance between the two genera. I have observed coiling of the cells in specimens of *O. Arbuscula* from Westport, Co. Galway, Ireland, equal in extent to that found in *O. cochleare*.

Fam. Chroolepidaceæ.

48. Microthamnion Kützingianum Näg. 5. Wicken Fen: Aug. 1898, amongst *Chara hispida*.

49. **Pilinia stagnalis**, sp. n. (Pl. 394, figs. 6–9). P. crustacea, sordide viridis; cæspitibus densissime aggregatis, circiter 500 μ altis; filamentis erectis fasciculatis brevibus, hinc inde breviter ramosis; filamentis procumbentibus in stratum cellularum pseudoparenchymaticum concretis; cellulis filamentorum erectorum subcylindricis, diametro 2–6-plo longioribus, cellulis terminalibus subtumidis, inflatis, interdum subirregularibus; cellulis filamentorum procumbentium plerumque paullo minoribus brevioribusque, diametro æqualibus vel duplo longioribus; membrana cellularum firma homogenea; contentum chlorophyllosum cellularum læte viride et granulosum; zoogonidangia terminalibus, subsphæricis ovatis vel subpyriformibus. Crass. cell. fil. erect. 16–25 μ; crass. cell. fil. procumb. 16–31 μ; crass. zoogonidang. 30–43 μ.

7. The Washes, Sutton, forming a tough dull green stratum on shells of *Limnæa peregra*.

This genus was established by Kützing in 1843, and up to the present it includes only two known species, *P. rimosa* Kütz. and *P.? diluta* Wood. The former is a small marine species found on wood, stones, and shells on the shores of continental Europe and N. America, and the latter is a freshwater species from Pennsylvania. *P. stagnalis* is distinguished from *P. rimosa* by its much larger size, its less branched filaments with comparatively longer cells, and by its freshwater habit. From *P.? diluta* it is distinguished by the different character of its stratum, the larger size of the cells, and by the swollen terminal cells of the less branched filaments.

The genus appears to me to be intermediate between *Trentepohlia* Mart. and *Gongrosira* Kütz., a striking resemblance in form being apparent between the filaments of *Pilinia stagnalis* and many other algæ belonging to Chroolepidaceæ, such as *Gongrosira trentepohliopsis* Schmidle (Oesterr. Botan. Zeitschrift, 1897, no. 2) and many of the arboreal species of *Trentepohlia* (cfr. Schmidle in *Flora*, 1897, Bd. 83, heft 2, 312, f. B 6, 7, 9). An analogous state of branching is also shown in some much larger plants belonging to Cladophoraceæ (cfr. Schmidle in Engler's Botan. Jahrbüch. 1896, Bd. 23, 263, cum f. 5, 6).

Fam. Cladophoraceæ.

50. Cladophora crispata (Roth) Kütz. 2. Dernford Fen, 1 mile S. of Shelford. 3. Comberton; Wimpole Park. 4. Pond near Girton. 6. Roswell Pits, Ely. 7. Near March.

51. C. GLOMERATA (L.) Kütz. 3. R. Cam at Cambridge; Coton. 6. Near Ely.

52. C. FLAVESCENS Ag. 2. Octagon Pond, Wimpole Park. 8. Sheep's Green, Cambridge. 7. Sutton West Fen.

53. RHIZOCLONIUM HIEROGLYPHICUM Kütz. 2. Dernford Fen, 1 mile S. of Shelford; Octagon Pond, Wimpole Park. 3. Sheep's Green, Cambridge. 6. In ponds near Ely. 7. Sutton West Fen. 8. In ditches near Guyhirne. Frequent, May to Aug.

Order CONJUGATÆ.

Fam. ZYGNEMACEÆ.

Subfam. MESOCARPEÆ.

54. MOUGEOTIA SCALARIS Hass. 6. Roswell Pits, Ely: July, 1898.

55. M. PARVULA Hass. 6. Roswell Pits, Ely. 7. In ditches near March. This species is somewhat scarce in the county, although I believe I have seen sterile specimens from other localities; also conjugating examples, but without ripe spores, from Chippenham Fen.

56. M. GENUFLEXA (Dillw.) Ag. Syn. *Mesocarpus pleurocarpus* De Bary; *Mougeotia mirabilis* (A. Br.) Wittr. 2. Dernford Fen, 1 mile S. of Shelford. 3. Sheep's Green, Cambridge; Hardwick. 6. Roswell Pits, Ely. 7. Sutton West Fen; in ditches about March. 8. Guyhirne. Frequently met with in a state of conjugation, but rarely with mature spores.

57. **M. paludosa**, sp. n. (Pl. 395, figs. 4–6). M. cellulis vegetativis diametro 6-14-plo longioribus, chlorophoris brevibus plerumque tertiam longitudine cellulæ partem occupantibus, cum pyrenoidibus 5 includentibus; cellulis conjugatis valde genuflexis; sporis subrectangularibus vel subelliptico-angularibus, lateribus brevioribus concavis et lateribus longioribus valde convexis, angulis truncatis et biundulatis, mesosporio glabro achrooque. Crass. cell. veget. 11·5–13·5 μ; long. spor. 44–49 μ; lat. spor. 32–38 μ.

5. Burwell Load, abundant: Aug. 1898.

This species, which belongs to the section *Staurospermeæ*, is readily distinguished from *M. viridis* (Kütz.) Wittr., *M. quadrangulata* Hass., and *M. gracillima* (Hass.) Wittr. by the greater thickness of its vegetative cells, the short chromatophore, and the peculiar form of the spore. From *M. capucina* (Bory) Ag. it is distinguished by the smaller diameter of its vegetative cells, which never assume the purple colour so characteristic of that species, by the chromatophore, and the different form of the spore. The greater diameter of the vegetative cells and the form of the spore also distinguish it from *M. calcarea* (Cleve) Wittr.

58. M. VIRIDIS (Kütz.) Wittr. 3. Hardwick. 5. Chippenham Fen.

59. M. GRACILLIMA (Hass.) Wittr. 3. Sheep's Green, Cambridge. 5. Wicken Fen.

60. M. ELEGANTULA Wittr. 'Om Gotl. och Ol. Sötv.-alg.,' Bih. till K. Sv. Vet.-Akad. Handl. Bd. 1, no. 1, 1872, 40. t. iii. f. 5–8. Crass. cell. veget. 4 μ. 5. Chippenham Fen; Wicken Fen. This

species was not observed in the conjugating state; but the extreme slenderness of the sterile cells, which were thirty to thirty-five times longer than their diameter, does not admit of its being any other species. Moreover, the chromatophores were restricted to the median portion of the cells exactly in the manner figured by Wittrock. *Distrib.*—Westmoreland, West Ireland, and Sweden.

Subfam. Zygnemeæ.

61. Zygnema cruciatum (Vauch.) Ag. 3. Wimpole Park: June, 1898. Sterile examples of a *Zygnema*, which was probably this species, were observed from the ditch by the Botanical Gardens, and from Sheep's Green, Cambridge.

62. Z. ericetorum (Kütz.) Hansg. Syn. *Zygogonium ericetorum* Kütz. 5. Chippenham Fen, the aquatic form [forma *fluitans* (Kütz.) Rabenh.], abundant, Aug. 1898.

63. Z. Ralfsii (Hass.) De Bary. 3. Chippenham Fen. The zygospores were rather larger than the average size for this species. Crass. cell. veget. 16 μ; long. zygosp. 29–31 μ; lat. zygosp. 23–24 μ.

64. Spirogyra arcta (Ag.) Kütz. var. catæniformis (Hass.) Kirchn. Syn. *S. catæniformis* (Hass.) Kütz. 6. Roswell Pits, Ely.

65. S. varians (Hass.) Kütz. 2. Dernford Fen, 1 mile S. of Shelford. 5. Chippenham Fen. 6. In ponds near Ely.

66. S. communis (Hass.) Kütz. 6. Ditches near Ely.

67. S. nitida (Dillw.) Link. 6. Ditches near Ely.

68. S. majuscula Kütz. Syn. *S. orthospira* Näg. 5. Chippenham Fen: very fine, Aug. 1898. Several irregularities were noticed in the conjugation, more particularly the presence of double spores, one in each filament; cfr. West and G. S. West, 'Obs. on Conj.,' Ann. of Botany, xii. 1898, t. v. f. 78–80. Spores were also observed which had been formed from only part of the contents of the conjugating cells; cfr. West & G. S. West, *l. c.* f. 74.

69. S. maxima (Hass.) Wittr. Syn. *S. orbicularis* (Hass.) Kütz. 6. Roswell Pits, Ely: July, 1898. The ripe zygospores are of the same rich brown colour as those of *S. majuscula*, and, although they are of considerably greater diameter, the spore-wall is comparatively thinner. The proportion of the thickness of the spore-wall to the diameter of the ripe spore is as 1 : 17·44; in the case of *S. majuscula* it is as 1 : 12·5.

70. S. gracilis (Hass.) Kütz. 3. Sheep's Green, Cambridge; Wimpole Park.

71. S. pellucida (Hass.) Kutz. Spec. Algar. 439; Rabenh. Flor. Europ. Algar. iii. 247. Syn. *Zygnema pellucida* Hass. Brit. Freshw. Alg. 143, t. xxv. f. 1, 2. (Pl. 395, figs. 1–3.)

S. dense cæspitosa, lubrica, flavo-viridis; cellulis vegetativis diametro 3½–9-plo (usque ad 12-plo) longioribus, extremitatibus non replicatis; chromatophoris 3–4 (plerumque 4), sublatis cum marginibus multe irregularibus et pyrenoidibus magnis, subrectis vel anfractibus laxissimis ½–1½ (rarissime 2–4); conjugatione scalariformi, cellulis fructiferis valde tumidis in parte mediana

et paullo abbreviatis ; zygosporis sublentiformibus, in altera positione orbicularibus altera late ellipticis, cellulas fructiferas non complentibus. Crass. cell. veget. 45·5–49 μ; diam. zygosp. 77–86 μ; crass. cell. fruct. circ. 95 μ.

1. Ditch by the Botanical Gardens, Cambridge : June, 1897, intermingled with *S. bellis*. 3. Sheep's Green, Cambridge : Aug. 1898. *Distrib.*—England (Herefordshire ; Yorkshire !).

This plant, which was originally described by Hassall as a species of *Zygnema* from specimens obtained from Cheshunt, Hertfordshire, is placed by De Toni in his *Sylloge Algarum*, p. 776, under the section "species incertissimæ, auctorum fide huc relatæ," and on p. 777 of the same work he says "A cl. Cooke rite omissa." In this I do not agree with him, as there is no other species of *Spirogyra* more characteristic than *S. pellucida*, and Cooke was distinctly in error in omitting it from his *British Freshwater Algæ*. Hassall's description is very imperfect and his figures are not good, and for this reason I feel bound to give an accurate description and figures of the plants I have observed. The vegetative cells occasionally attain a relatively great length (as much as 540 μ); and the chromatophores, which are generally four in number, exhibit a considerable range of variation with regard to their disposition, sometimes being arranged in a very lax spiral manner, and at other times being quite straight. The nucleus is a narrowly elliptical body placed transversely across the centre of the cell, and is clearly visible in living specimens ; in fact, I know of no species of this genus in which it can be so readily seen without the use of staining reagents. The peculiarly inflated portion of the fructiferous (female) cells is a noteworthy character, and, so far as I am aware, is possessed by only one other species of *Spirogyra*, viz. *S. sphærospora* Hirn in *Acta Societatis pro Fauna et Flora Fennica*, xi. (1895), no. 10, p. 10, t. i. f. 2.

72. S. BELLIS (Hass.) Cleve. 1. In the ditch by the Botanical Gardens, Cambridge : June, 1897, intermingled with *S. pellucida* (Hass.) Kütz.

73. S. GREVILLEANA (Hass.) Kütz. 3. Sheep's Green, Cambridge ; Hardwick, in ponds.

Fam. DESMIDIACEÆ.

74. GONATOZYGON RALFSII De Bary. 5. Chippenham Fen, amongst *Utricularia vulgaris ;* Wicken Fen, amongst *Myriophyllum spicatum*. 6. Roswell Pits, Ely.

75. G. BRÉBISSONII De Bary. 6. Roswell Pits, Ely.

76. G. KINAHANI (Arch.) Rabenh. 3. Sheep's Green, Cambridge: in pond amongst *Spirogyra* sp., July, 1898.

*77. MESOTÆNIUM KRAMSTAI Lemmerm. in Forschungsberichte aus der Biol. Stat. zu Plön, iv. 1896, 115–117, c. fig. 8–10. Long. cell. 42–77 μ; lat. 9–10·5 μ. 5. Chippenham Fen, in small pools amongst *Utricularia vulgaris :* Aug. 1898. This species, the most elongate of the genus, was discovered by Lemmermann in Aug. 1895, in small pools on the "Riesengebirge," between Bohemia and

Prussian Silesia. The Cambridgeshire specimens were of variable length, and all had the poles truncately rounded; certainly more truncate than figured by Lemmermann. With regard to the cell-contents, Lemmermann states (*l.c.* 116): "Das Chlorophor besteht aus einer axilen Platte, wie sie sich in ähnlicher Weise bei der Gattung *Mougeotia* Ag. vorfindet." All the examples observed were packed with contents of an oily nature, as is so often the case in species of this genus.

78. Penium digitus (Ehrenb.) Bréb. 7. Ponds S. of March.

79. P. sp. Long. 27 μ; lat. 13 μ. Only one specimen of this species was observed; the cell was oblong-elliptical, with semicircular poles, and in the middle there was a faint constriction. 8. Guyhirne.

80. P. cruciferum (De Bary) Wittr. Syn. *Cosmarium cruciferum* De Bary. 5. Chippenham Fen.

81. Closterium prælongum Bréb. forma brevior West. 3. Lord's Bridge.

82. C. Pritchardianum Arch. 3. Sheep's Green, Cambridge.

*83. C. peracerosum Gay, Essai Monogr. Conj., Montpellier, 1884, 75, t. ii. f. 18; Bull. Soc. Bot. Fr. 1884, xxxi. 339.

Var. elegans, var. n. Var. cellulis elegantulis, apices versus plus attenuatis curvatisque, ventre paullo tumidioribus, apicibus angustis sed obtusis; pyrenoidibus in semicellula unaquaque 5-8; locellis apicalibus parvis subterminalibus et corpusculis singulis vel binis includentibus. Long. 196-258 μ; lat. 14-15 μ (Pl. 396, figs. 1, 2).

3. Comberton. 7. Sutton West Fen.

This variety is easily distinguished from the typical form by its somewhat more pronounced curvature, its greater attenuation towards the apices, which are rounded, and by the different nature of the apical locelli; it is also slightly larger, and has a more prominent ventral inflation.

84. C. acerosum (Schrank) Ehrenb. 2. Dernford Fen, 1 mile S. of Shelford. 3. Hardwick; Lord's Bridge. 5. Wicken Fen.

An elongated variety of this species was observed from Sheep's Green, Cambridge, which possessed parallel margins in the central portion of the cell, and attenuated rounded apices. The cell-membrane was of a pale straw-colour and very finely striated, and there were 10-11 pyrenoids in each semicell. In its dimensions and in the parallel lateral margins it agrees with var. *angolense* West & G. S. West ('Welw. Afric. Alg.,' Journ. Bot. 1897, 79), but the cell-membrane is quite different. Long. 725 μ; lat. 29 μ.

*Var. angolense West & G. S. West, *l.c.* 6. Roswell Pits, Ely. Long. 773 μ; lat. 30 μ.

85. C. lanceolatum Kütz. 7. The Washes, Sutton.

86. C. Lunula (Müller) Nitzsch. A rather small form with a faintly straw-coloured cell-membrane; long. 375 μ; lat. 58 μ. 3. Sheep's Green, Cambridge.

87. C. Ehrenbergii Menegh. 2. Dernford Fen, 1 mile S. of Shelford. 3. R. Cam at Cambridge; Sheep's Green, and in a ditch by the Barton Road, near Cambridge; Orwell; Wimpole Park. 7. Sutton West Fen. 8. Twenty-foot River, between March and Guyhirne.

Many examples of this species were obtained from Sutton West Fen agreeing almost exactly with the "forma ventre levissime inflato, dorso majus curvato quam in f. typ." mentioned by Borge ('Süssw. Chlor. Archangel,' Bih. till K. Sv. Vet.-Akad. Handl. Bd. 19, Afd. iii. no. 5, 16, t. i. f. 11). Long. 500–541 μ; lat. 114–137 μ. Lat.: long. = 1 : 3·9–4·4.

88. C. Malinvernianum De Not. 2. Dernford Fen, 1 mile S. of Shelford. 3. Sheep's Green, Cambridge; Wimpole Park.

89. C. moniliferum (Bory) Ehrenb. 2. Dernford Fen, 1 mile S. of Shelford. 3. In a ditch by the Barton Road, near Cambridge; Hardwick. 7. The Washes, Sutton; in ponds, March.

90. C. Leibleinii Kütz. 3. Hardwick. 7. Sutton West Fen; ponds S. of March. 8. Guyhirne; Twenty-foot River, between March and Guyhirne. Two very distinct forms of this species were seen from the ponds in the neighbourhood of March: (*a*) a small form, lat. 22 μ, apic. inter se distantibus 138 μ; (*b*) a larger, more curved form with a comparatively smaller ventral inflation, lat. 33–37 μ, apic. inter se distant. 154–202 μ.

91. C. Dianæ Ehrenb. 3. Sheep's Green, Cambridge. 5. Chippenham Fen.

92. C. parvulum Näg. 5. Wicken Fen; Chippenham Fen. 6. Roswell Pits, Ely. 7. Near March.

93. C. Venus Kütz. 3. Hardwick.

94. C. Jenneri Ralfs, var. robustum, var. n. (Pl. 396, fig. 9). Var. cellulis curvatioribus apices versus et apicibus crassioribus. Lat. 12·5 μ; lat. apic. circ. 6–7·5 μ; apic. inter se distant. 61–77 μ. 8. Twenty-foot River, between March and Guyhirne. I have also examined specimens of this variety from N. Yorkshire.

*95. C. laterale Nordst. in Wittr. et Nordst. Alg. Exsic. 1880, no. 383. Long. 477 μ; lat. 57 μ; lat. apic. circ. 7·5 μ; striis 12 in 10 μ (Pl. 396, fig. 3). 2. Dernford Fen, 1 mile S. of Shelford. Since the original discovery of this rare species of *Closterium* at Pasto de Olaria, Pirassununga, Brazil, in Jan. 1880, it has not been placed on record for any other locality, and its extraordinary occurrence in Cambridgeshire is deserving of particular mention. It is at first sight remindful of a short stumpy form of *C. Ralfsii* Bréb., and, although it possesses the tinted, delicately striated membrane of that species, it is readily distinguished by its outward form alone. I did not see any living specimens, and I am therefore unable to comment on the structure of the chlorophyll, which is peculiar for a *Closterium* of this type; cfr. Nordstedt, *l. c.* "laminis chlorophyllaceis circiter 5 sublateralibus nucleos amylaceos multos in quaque lamina in seriem unicam ordinatos includentibus, locello apicali granulis (circ. 10) repletio."

96. C. LINEATUM Ehrenb. 5. Chippenham Fen; very large forms: long. 690 μ; lat. 29 μ; lat. apic. circ. 7 μ.

97. C. ROSTRATUM Ehrenb. 2. Octagon Pond, Wimpole Park: frequent amongst *Potamogeton natans*.

98. C. KÜTZINGII Bréb. 5. Wicken Fen; Chippenham Fen.

99. C. GRACILE Bréb. 5. Chippenham Fen: somewhat scarce, Aug. 1898. Long. 188–238 μ; lat. 5·5–6 μ.

100. C. PRONUM Bréb. 3. Wimpole Park. 5. Wicken Fen; Chippenham Fen. 7. Near March. Long. 384–423 μ; lat. 8–8·5 μ.

101. C. SUBPRONUM West. 5. Wicken Fen. Long. 716 μ; lat. 5 μ.

102. C. ACUTUM (Lyngb.) Bréb. 3. Sheep's Green, Cambridge. 5. Burwell Load; Wicken Fen.

103. PLEUROTÆNIUM CORONATUM (Bréb.) Rabenh. var. NODULOSUM (Bréb.) West. Syn. *Pleurotænium nodulosum* (Bréb.) De Bary. 5. Chippenham Fen. The specimens possessed a circlet of eight small granules at the apex of each semicell; long. 400–441 μ; lat. ad bas. semicell. 52–57 μ, ad apic. 24–25 μ.

104. P. TRABECULA (Ehrenb.) Näg. 5. Chippenham Fen; Wicken Fen. 6. Roswell Pits, Ely. A large specimen of this species was noticed from Wicken Fen with two undulations at the base of each semicell; long. 664 μ; lat. ad bas. semicell. 46 μ, ad apic. 32 μ.

Forma GRANULATA (Pl. 396, fig. 6). Forma membrana distincte granulata, granulis irregulariter ordinatis. Long. 486 μ; lat. ad bas. semicell. 3·5 μ, ad apic. 25 μ. 5. Chippenham Fen. This is an analogous form to *P. Ehrenbergii* var. *granulatum*.

105. P. EHRENBERGII (Bréb.) De Bary. 5. Chippenham Fen. A form of this species was noticed with three undulations at the base of each semicell, the third one being very slight, and with a distinctly narrowed apex; long. 532 μ; lat. ad bas. semicell. 37 μ, ad apic. 18 μ, infra apic. 28 μ (Pl. 396, fig. 4).

Another form (Pl. 396, fig. 5) somewhat approached var. *undulatum* Schaarschm. (in Magyr. Tudom. Akad. Math. s. Természettud. Közlemények, xviii. 1882, 278, t. i. f. 21), but the upper third of the semicells was destitute of undulations. It is intermediate between the two forms figured by Schmidle in 'Einige Algen aus Sumatra,' *Hedwigia*, Bd. xxxiv. 1895, 300, cum fig. Cfr. also the form of *P. Ehrenbergii* described by Borge ('Süssw. Chlor. Austral,' Bih. till K. Sv. Vet.-Akad. Handl. 1896, Bd. 22, Afd. iii. no. 9, 26, t. iii. f. 46) as "*Docidium basiundatum* forma diametro 17–19-plo longior, apicibus attenuatis"; this form of Borge's is certainly not *Pleurotænium basiundatum* West & G. S. West ('Freshw. Alg. Madagascar,' Trans. Linn. Soc. bot. ser. 2, v. 1895, 45, pl. v. f. 35). Long. 709 μ; lat. ad bas. semicell. 40 μ, ad apic. 27 μ.

106. EUASTRUM INSULARE (Wittr.) Roy in Scott. Naturalist, April, 1877. Syn. *E. binale* (Turp.) Ehrenb. var. *insulare* Wittr. in

Bih. till. K. Sv. Vet.-Akad. Handl. Bd. 1, no. 1, 49, t. iv. f. 7. A form with the base of the semicells on each side less rectangular; long. 28 μ; lat. 19 μ; lat. isthm. 5 μ; crass. 11 μ (Pl. 396, fig. 11). 5. Wicken Fen. This form resembles in some respects *Cosmarium sublobatum* var. *crispulum* Nordst.

107. Cosmarium quadratum Ralfs. 5. Chippenham Fen.

108. C. holmiense Lund. var. integrum Lund. 5. Chippenham Fen.

109. C. anceps Lund. 5. Chippenham Fen, abundant in a ditch: Aug. 1898. Long. 25–27 μ; lat. 14·5–15·3 μ; lat. isthm. 10·5–11·5 μ; crass. 10·5 μ. The forms observed were a little smaller than the type, but otherwise exactly similar. In Rospraw Wydz. matem.-przyr. Akad. Umiej. w Krakow, 1896, xxxiii. 43, Gutwinski describes a "forma *glabra*" of *Dysphinctium anceps* (Lund.) Hansg., but, as the typical form is perfectly smooth, the reason for this is not quite apparent. Moreover, following Hansgirg, De Toni, Schmidle, and others, he places the plant under the genus *Dysphinctium* Näg., and about this genus I should like to offer a few remarks. It is regarded as identical with *Calocylindrus* (De Bary) Kirchn., and the characters differentiating it from the genus *Cosmarium* are supposed to be—(1) the cylindrical cells (in vertical view circular); (2) the very slight median constriction; and (3) the absence of a basal inflation. But circular vertical views are met with along with every possible grade of constriction (cfr. *Cosmarium annulatum* (Näg.) De Bary, *C. Welwitschii* West & G. S. West, and *C. globulatum* West & G. S. West); and species are known, which, although but very faintly constricted, yet possess an elliptical vertical view (cfr. *C. anceps* Lund., *C. Oocystidum* West & G. S. West). To which genus do these species belong? Also, is it possible to draw any demarcation in the depth of the constriction, and to say definitely, in all cases, which species belong to *Dysphinctium* and which to *Cosmarium*? Even those who most strongly uphold the genus *Dysphinctium* include in it species of *Cosmarium* with a narrowly linear sinus, such as *C. speciosum*, *C. quadratum*, &c., and at the same time leave out many others which are less deeply constricted. *C. microsphinctum* has also been placed as a *Dysphinctium*, and this species not only possesses a linear sinus, but also an inflation on each side of the vertical view. In addition to instances of this kind, it seems somewhat paradoxical that two such closely allied species as *C. speciosum* and *C. subspeciosum* should be placed in different genera.

To sum up, *Dysphinctium* is a genus based upon no definite group of characters, and includes species about the position of which opinion must always remain divided. There is no doubt the genus *Cosmarium* is very large and unwieldly, including, as it does, some 700 species, and for this reason a division into smaller genera would be very acceptable. A noteworthy suggestion was made by Turner ('Freshw. Alg. of E. India,' Kongl. Sv. Vet.-Akad. Handl. Bd. 25, no. 5, 1892, 73) to divide the genus into sections according to the outward form of the semicells, but it is more probable that

the ultimate division of the genus will have to be based rather upon combinations of characters than upon mere difference in outward form alone.* It appears to me that as yet we know but little concerning the Cosmaria of the world, there being as many as two hundred and sixty species recorded as British, and only about one hundred for the whole continent of Africa; and, until our knowledge of the genus has been much augmented by future research, any attempt to subdivide it into other genera, which, far from fulfilling the requirements of the case, only render matters more complicated, is to be strongly deprecated.

110. C. GRANATUM Bréb. 5. Wicken Fen; Chippenham Fen. 6. Roswell Pits, Ely. 8. Twenty-foot River, between March and Guyhirne. A number of forms of this very variable and cosmopolitan species were observed, notably one agreeing with that mentioned by Gutwinski in *Glasnika Zemalsjskog Muzeja u Bosni i Hercegovini*, viii. 1896, 374, t. i. f. 2 *a'*; and Borge, 'Subfoss. sötv. alg. från Gotland,' *Botaniska Notiser*, 1892, t. 1, f. 4. Long 41 μ; lat. 26·5 μ; lat. isthm. 7·5 μ.

Var. SUBGRANATUM Nordst. 2. Dernford Fen, 1 mile S. of Shelford. 3. Lord's Bridge; Wimpole Park. 5. Wicken Fen; Chippenham Fen. 6. Roswell Pits, Ely. 7. The Washes, Sutton, and Sutton West Fen; March. 8. Guyhirne.

Several small forms were observed intermediate between *C. granatum* var. *subgranatum* and *C. Meneghinii* var. *granatoides* Schmidle in Berichte der Naturf. Gesellschaft zu Freiburg i. B. 1893, 28, t. vi. f. 15 (since placed by him as a species—*C. granatoides* Schmidle in *Flora*, 1894, 52, t. vii. f. 12). Many of these forms had the upper margins of the semicells concave, a character on which Lagerheim founded his var. *concavum* ('Contrib. Fl. Alg. Ecuador,' Extr. Los Anales de la Universidad de Quito, 1890, 16).

111. C. KLEBSII Gutw. 'Materyały Flory Glonów Galicyi,' Sprawozd. Komisyi fizyog. Akad. Umiej. w Krakowie, xxviii. pt. ii. 125, t. iii. f. 3. Long. 31 μ; lat. 29 μ; lat. isthm. 10·5 μ. Also a proportionately longer form; long. 41 μ; lat. 32·5 μ; lat. isthm. 10 μ. 5. Wicken Fen.

A somewhat depressed form was noticed from Roswell Pits, Ely; long. 37 μ; lat. 35 μ; lat. isthm. 11 μ; crass. 18 μ. This form approached *C. Phaseolus* Bréb. var. *achondrum* Boldt ('Siber. Chlorophy.,' Ofv. af K. Vet.-Akad. Förh. 1885, no. 2, 103, t. v. f. 7), but I fully agree with Schmidle (*Flora*, 1896, Bd. 82, heft 3, 307) that the latter has nothing to do with *C. Phaseolus*, a species I know well from both Europe and America. Perhaps Boldt's variety really belongs to *C. Scenedesmus* Delp.

112. C. BIOCULATUM Bréb. 5. Wicken Fen. 6. Roswell Pits, Ely; long 17 μ; lat. 17 μ; lat. isthm. 5 μ. Rather larger forms from 5. Chippenham Fen; long. 21 μ; lat. 21 μ; lat. isthm. 6 μ.

* It is a strange fact that Turner does not attempt to arrange his 137 Indian species of *Cosmarium* under the seven subgenera into which he proposes to divide the genus. Had he done so, it would have been possible to form some idea as to the comparative usefulness of his proposed divisions.

113. C. PROTUBERANS Lund. 'Desm. Suec.' in Acta R. Soc. Scient. Upsal. ser. 3, viii. no. ii. 1870, 37 (sep.), t. iii. f. 17. The forms noticed were rather more deeply constricted than the Swedish ones, the apex of the sinus was more conspicuously ampliated, and the protuberance in the vertical view considerably reduced. The membrane was minutely scrobiculato-punctate, as in the type. Long. 22–23 μ; lat. 19–21 μ; lat. isthm. 5·2 μ; crass. 12 μ. 5. Chippenham Fen (Pl. 394, fig. 12).

(To be continued.)

CRITICAL NOTES ON SOME SPECIES OF *CERASTIUM*.

By Frederic N. Williams, F.L.S.

(Continued from Journ. Bot. 1898, p. 387.)

35. C. ARVENSE L. Sp. Plant. 438 (1753).—Kew Herbarium lacks satisfactory fruit-specimens of this very common plant. The species is cosmopolitan. In the Old World it ranges from the Arctic Sea to Cochinchina (*Loureiro*), and in the New World from Labrador to the island of Tierra del Fuego (*Hooker f.*). Hooker mentions its occurrence in the Himalayas, but it is omitted from Fl. of British India. As regards altitude, specimens of *C. arvense* var. *strictum* have been collected at 2750 metres in the Eastern Caucasus (*C. A. Meyer*), and specimens of *C. arvense* var. *arvensiforme* at 3500 metres in the Andes of Bolivia (*Mandon*).

36. C. ARVENSIFORME Wedd. in Ann. Sc. Nat. 1864, 296 [= *C. arvense* var. *arvensiforme* Rohrb. in *Linnæa*, xxxvii. 305].—Founded on specimens collected by Weddell and Mandon in the Andes of Bolivia, as mentioned above. The following characters distinguish the plant among the many forms of *C. arvense*:—

Caules diffusi; folia lanceolata vel lineari-lanceolata, obtusiuscula vel mucrone obtuso subcalloso acuminata; flores magni; sepala 6–8 mm. Differt habitu magis præsertim foliis numerosioribus ac latioribus quam certis characteribus.

37. C. ATLANTICUM Dur. in Duch. Rev. Bot. ii. 437 (1846–47). From an examination of authentic specimens in Herb. Kew., I should be disposed to reduce the species to *C. Duriæi*, which has not hitherto been recorded in Algeria, but which occurs in the south of Spain and in Asia Minor. The specimens of both species seem to match, and the description of *C. Atlanticum* is almost a verbal transcript of *C. Duriæi*. It is also allied to *C. echinulatum*, which, according to Battandier and Trabut, is "voisin du *C. Riæi*." I have little hesitation, therefore, in adding *C. Duriæi* to the flora of Algeria, as represented by these specimens. In the *Index Kewensis* Spain is given as the habitat of *C. Atlanticum*, which is an obvious slip. According to Durieu, it ranges from Constantine to Tlemcen.

38. C. ATRATUM Lapeyr. Hist. Abr. Pyren. 265 (1813); et Fig. Fl. Pyren. t. 102 (1795–1801): = *C. alpinum* var. *atratum* Rouy &

Fouc. Fl. de France, iii. 205 (1896).—A typo *C. alpini* differt, plantâ luride viridi villosiore, dichasio viscidiore, pilis longis et glandulis atricoloribus commixtis.

Syn. *C. squalidum* Ram. in Mem. Acad. Paris, vi. 158 (1826).

By Willkomm this variety is sunk in *C. alpinum* var. *lanatum*, from which it is distinguished by the viscid dichasia, and shorter villous hairs. The plant grows on steep rocks in the Pyrenees.

39. C. ATROVIRENS Bab. in Mag. Zool. & Bot. ii. 317 (1838); Hook. f. Stud. Fl. Brit. Isl. ed. 3, 59.—Specimens so named with straight capsules and flowers mostly tetramerous are not distinguishable from *C. tetrandrum*. Overlooked by Grenier.

40. C. ATTICUM Boiss. & Heldr. Diagn. Pl. Or. nov. Ser. ii. i. 93 (1853).—This species was subsequently reduced to *C. brachypetalum* var. *luridum*; but after examining authentic specimens recently received from Prof. von Heldreich, *Herb. Græcum norm.* n. 1218 (1895) I find that there are certain characters which refer the plant to the *C. triviale* group, rather than to the group containing *C. brachypetalum* and *C. ruderale*. In these specimens examined the filaments are glabrous as in *C. triviale*, and the petals are distinctly ciliate towards the base at the margin, constant characters of specific importance. From these specimens I have drawn up a description somewhat modified from the original:—

Annuum, pallide viride, totum pilis mollibus patulis non glutinosis velutino-hispidum. Caules humiles simplices erecti in dichasium pluries dichotomum laxum multiflorum soluti. Folia ovata vel oblonga, obtusa. Bracteæ herbaceæ villosæ foliis consimiles. Pedicelli post anthesin tandem erecti, 1½–2-plo calyce longiores, capsulam inclinatam ferentes.

Hab. Greece: Mt. Œnos, in the island of Cephalonia, and Mt. Ozea (Parnes), in the nome of Attica.

41. C. AZORICUM Hochst. ex Seub. Fl. Azor. 45, t. 14 (1844). A species endemic in the Azores, of the *C. tomentosum* group. Among European species seems nearest *C. Orbelicum* and *C. Apuanum* in specific characters. I know of no other species of *Cerastium* from these islands. Some specimens collected many years ago were referred to *C. campanulatum*, but they prove on examination to belong to this species. I have examined the specimens collected by Prof. William Trelease in August, 1894, at Ponte Flores (n. 120) and at Ponte Delgada (n. 122), received at Kew in January of the present year, and from this material have drawn up a fresh description. These specimens represent all the three forms mentioned by Seubert. The other specimens in Herb. Kew. were raised from seed by Mr. H. C. Watson, and are not so satisfactory, though they are readily recognizable from the figure given by Seubert.

Planta perennis, dense pubescens, pilis flavescentibus. Caules ramosi. Dichasium 7–10-florum; pedicelli calycem superantes, fructiferi basi ad apicem recti; bracteæ lanceolato-lineares acutæ anguste scariosæ. Calyx basi subtruncatus; sepala exteriora lanceolata subobtusa anguste scariosa, interiora paullum angustiora acuta

late scariosa. Petala obovato-cuneata bidentata calycem æquantia. Capsula recta calyce paullum longior. Semina triangulari-sub-auriformia echinato-tuberculata, dorso sulcata.

Forma *communis* (1): Caules basi prostrati, pumili; folia spathulato- vel ovato-lanceolata.

Forma *elatior* (2): 45–60 centim.; caules adscendentes (semina in capsula mediocri 45).

Forma *latifolia* (3): Folia ovato-oblonga 37–49 mm.

42. C. Balcanicum Vandas, Beitr. fl. Bulgar. in Sitzgsber. K. Böhm. Gesellsch. Wissensch. 1888, 436; Velen. Fl. Bulgarica, 87 (1891): = *C. grandiflorum* var. *Balcanicum* Williams.—This plant from the Balkan Mountains can only be considered one of the many forms of *C. grandiflorum*, agreeing perhaps most nearly with var. *alpinum* Boiss. I was at first disposed to reduce it to var. *speciosum* Boiss., but further examination of specimens of the latter collected by Haussknecht on the siliceous serpentine rock of Mt. Zygos in Epirus, which have been very carefully dried, seem to show that they cannot be referred to *C. grandiflorum* at all. The following characters readily distinguish the plant from the normal forms of *C. grandiflorum*:—

Planta laxe cæspitosa, 20–35 cm. alta. Caules apice ramosi, remotius foliati, inferne pilis pubescentibus sparsim vestiti vel glabri, superne pilis densis brevibus glanduliferis pilisque longioribus eglandulosis vestiti. Folia lanceolato-linearia glabrata vel sparsim puberula. Dichasium 3–7-florum. Sepala lanceolata minus obtusata.

Hab. In stony places and among juniper shrubs near the top of Mt. Osogovska Planina, above Kostendil in N. Bulgaria, close to the Turkish frontier-posts.

43. C. banaticum, Rochel, ex Ind. Kew. i. 483.—Referring to the work cited in the *Index Kewensis*, I find that the plant is there described as *C. grandiflorum* var. *banaticum*, p. 33, t. 2 (1828). It is true that the name occurs in specific guise in the index, but the index is in that vicious form in which the specific and varietal names are in a single alphabetical series. The name is first used in a specific sense by Heuffel, *Enum. pl. Banat. Temes.* (1858). Rochel, in the former work, says, "capsula calyce 2–3-plo longior." There are some specimens in Herb. Kew. labelled *C. banaticum* Rochel, received from Mr. Lujo Adamovic, of Pirot, in Servia: in these the capsule is only slightly longer than the calyx. I wrote to this accomplished botanist for further information about these Servian specimens, and cannot do better than quote his letter:—"Possideo enim formas capsulis calyce sesquilongioribus (et non rare 2–3-plo sesquilongioribus) atque individua capsulis calycem vix superantibus. Dentes calycum sunt nunc haud vel vix reflexi nunc evidenter revoluti. Ceterum variat planta atque indumento nunc densiore nunc sparso, glabriusculo. Sitne magnitudo capsularum (et lusus indumenti) factoribus geographicis (œconomicis) potius adtribuenda?" It is pointed out elsewhere that the ripening capsule increases in length considerably in some species, and there is often a difference between the capsule of a central flower and the less developed capsule of the alar flowers, whether in the primary

or in the secondary branches of the same dichasium. The specific character is therefore to be sought in the dry dehiscent capsule of a terminal flower.

There are certain characters which individually and collectively seem to separate the plant from *C. grandiflorum*, and it must be remembered that specimens of this species, in one of its polymorphous forms which are distributed in Hungary, Servia, and Roumania, have been labelled "C. Banaticum" without due regard to its distinguishing characters. The following characters seem to separate it from *C. grandiflorum*:—Multicaule dense cæspitosum, 30 centim. Caules ad medium dense foliosi superne in cymam laxam multifloram longe ramosam divisi. Folia acuminata margine haud revoluta. Dichasium sæpe 7-florum; bracteæ ventricosæ ovatæ dorso herbaceæ; pedicelli calyce 2–3-plo longiores. Capsula elevatim nervosa 13–15 mm. Semina angulata echinato-tuberculata. Indumentum nunc evanescens, nunc glandulosum, nunc fere eglandulosum canum inventum.

The correct authority for this plant is *C. banaticum* Heuff., Enum. pl. Banat. Temes. p. 51 (1858); Velen. Fl. Bulgarica, 88 (1891). In an additional supplement (1893) to the latter, Velenovsky says: "Species hæc in Bulgaria sat polymorpha videtur. . . . . Folia nunc latiora, nunc tenuiora præstant. Florum fructuumque characteres immutati permanent, quare nullâ ratione cum affini *C. grandifloro* coadunandum est." The revolute margins of the leaves in the latter is certainly a distinctive character. Grenier mentions the plant under the name of *C. grandiflorum* var. *glabratum*, and distinguishes it by "pedunculis crispule pubescentibus et pilis in basi foliorum flexuosis," and does not note any of the characters mentioned above. Janka states that it is quite a distinct species, and separated from *C. grandiflorum* by the following characters:—"Glabritie, pube scilicet in totâ plantâ brevi reversâ, bracteis dorso herbaceis, sepalis toto dorso herbaceis, apice angustissime membranaceis, seminibus numerosis minoribus." Whereas in *C. grandiflorum*,—"indumentum lanuginosum, intricatum, bracteæ dorso membranaceæ vel hyalinæ, sepala a medio dorsi vel paulo altius hyalina, semina pauca (2–3) minora." Janka overlooks the character of the capsule, which, as Seringe rightly states in DC. Prodr., is not longer than the calyx. Again, Visiani says of *C. grandiflorum*: "Capsulam duram, opacam, nec membranaceam, pellucidam, ... calyci æqualem vel paulo longiorem, dentibus 10 truncatis varie connatis, nunc 5 bidentatis, nunc uno alteroque tridentato aut indiviso, demum basi rimis 5 dehiscentem." There is scarcely any doubt that Reichenbach's figure of *C. suffruticosum* represents *C. banaticum*; and, apart from the plane capsular teeth, the latter much more resembles in habit *C. arvense* than *C. grandiflorum*. But it would be unwise to attempt to identify the Linnean *C. suffruticosum* with the plant from Banat, from the vague diagnosis, "caule perenni procumbente, foliis lineari-lanceolatis subhirsutis."

I have reason, therefore, for believing that the interesting series of specimens collected by Mr. Lujo Adamovic in Servia do not con-

sist wholly of *C. banaticum*, but in part of *C. grandiflorum*. The leaves of *C. banaticum* are altogether glabrous, though ciliate at the margin towards the base: the sepals are not slightly membranous at the tip, as Janka states, but all along the edge, so that the hyaline margins taken on both sides of each sepal are together about equal in breadth to the central herbaceous portion. I have discussed these specific differences at length, after the examination of authentic specimens, in order to justify the raising of this plant to specific rank, since it has frequently been regarded as a variety only of *C. grandiflorum*.

Hab. Hungary: counties of Temes and Torontal (the original specimens). Servia (*Adamovic*). Roumania: the Iron Gates of the Danube (*Borbás*, 1873). Bulgaria: Mt. Rilo, in the Balkans (*Velenovsky*); also Mt. Teteven-Balkan.

Iconogr. Sturm, Deutschl. Fl. h. 64 (1834); Reichb. Ic. Fl. Germ. Helv. 4987 b (*C. suffruticosum*).

44. C. BARBULATUM Wahlenb. Fl. Carpat. Princ. 137, n. 446 (1814); Link, Enum. Hort. Berolin. i. 433 (1821): = *C. brachypetalum* var. *prostratum* Williams.—Wahlenberg describes two forms, of which he refers the first (var. *α*) to *C. rotundifolium* Kit. MS., and a second with "foliis oblongis" to *C. brachypetalum* Kit. MS. The former was taken up and described by Fischer (1812). There is no reason for separating the two, which I propose as a var. of *C. brachypetalum*. The specimens were collected in the counties of Lipto and Szepes, in Hungary. In a note by Gay attached to his specimens (December, 1831), comparison is suggested with a plant labelled "C. barbatum" in Ducros' herbarium. The character of the hairs is described by Wahlenberg:—"Villi totius plantæ glandulis omnibus carent, et sæpe tam tenues ut articuli eorum vix conspiciantur, sed longitudine diam. caulis plerumque superant. Calyces duplo minores quam in *Cerastio vulgato*; foliolis exterioribus sine marginibus diaphanis, villis extra apicem sat longe prominentibus." Without having seen specimens, Grenier reduced the plant to *C. glomeratum* from Link's observation, "Caulis magis viscosus, folia subrotunda, hirsuta, viscida."

45. C. BEHRINGIANUM Cham. et Schlecht. in *Linnæa*, i. 62 (1826) [*Beeringianum*]: = *C. alpinum* var. *Behringianum* S. Wats. Bibliograph. Index, 100 (1878).—The original description of this plant is as follows:—"Caules basi cespitosi et decumbentes, dein floriferi erecti, strictissimi 8-pollicares, inferne dense foliosi, in erecta parte uno alterove pari foliorum instructi. Folia oblonga obtusa aut acutiuscula, 6 lin. et ultra longa, $1\frac{1}{2}$ lin. lata. Panicula terminalis dichotoma, 5–7-flora, pedunculus alaris circiter pollicaris, rami laterales duo eum superantes iterum pedunculo alari et ramo uno alterove bibracteato unifloro terminantur. Rami totius paniculæ patuli. Bracteæ ad basin paniculæ ramificationum parvæ lanceolatæ pilosæ non scariosæ. Pedunculi peractâ florescentia declinati subhorizontales, flore nutante aut cernuo. Sepala elliptica acuta margine lato scarioso. Petala alba calyce sesquilongiora. Capsula cylindrica curviuscula calyce sesquilongior. Planta tota

pilis rigidiusculis inæqualibus hirta, glandulis stipitatis immixtis; superiores partes, præsertim inflorescentiæ, viscosæ."

De Regel has made a very careful study of the East Siberian forms of *C. alpinum* in *Bull. Soc. Nat. Mosc.* 1862, pt. ii. 315. The geographical distribution of the various forms of this variety are for the great part taken from his memoir. The result of his examination and comparison of these forms from East Siberia and the neighbouring territory of the United States is set forth with that critical appreciation of the relative value of subspecific characters and lucidity of treatment, which both he and Maximowicz have brought to bear with so much success on the systematic elucidation of the Russian flora.

C. alpinum var. *Behringianum*.—Inferne plus minus tomentellum, superne pilis glandulosis intermixtis viscidulum. Caudiculi decumbentes, et hâc ex re plus minus dense cæspitosi, cauliculis adscendentibus vel erectis, nunc unifloris, nunc cyma 2–pluriflora terminatis; folia oblonga, quam in typo minora.

Lusus 1, *typicus*.—*Hab.* Siberia: R. Argun in prov. of Trans-Baïkalia; R. Kolyma in prov. of Yakutzk; R. Kaja in prov. of Irkutzk, near Irkutzk; Maritime Province, Unalaschka, in the Aleutian Islands. United States: Alaska, C. Hope, Kotzebue Sound, and island of Sitka; Rocky Mountains of Colorado and Arizona. British Columbia. Rocky Mountains of Western Canada (*Provancher*).

Lusus 2, *pauciflorus*.—*Hab.* Maritime Province of Siberia: Kamtschatka, and island of S. Paul in Behring Sea. United States: island of Sitka, off the coast of Alaska.

Lusus 3, *grandiflorus*.—*Hab.* Siberia: Ajan Mtns. in prov. of Yakutzk; Kamtschatka, in the Maritime Province. United States: Kotzebue Sound, in Alaska.

Lusus 4, *Mertensianus*.—*Hab.* Siberia: Unalaschka, in the Aleutian Islands.

Lusus 5, *flavescens*.—*Hab.* Siberia: island of S. Paul, in Behring Sea. Japan: Kurile Islands.

The usual forms of this polymorphous variety are sometimes difficult to distinguish from stunted short-leaved forms of *C. arvense*, but the flowers are less densely aggregated, and have the slightly larger, firmer, and more herbaceous sepals characteristic of *C. alpinum*.

46. C. Biebersteinii DC. in Mém. Soc. Phys. Genèv. i. 436 (1823); Prodr. i. 418 (1824); Pl. Rar. Jard. Genèv. t. 11 (1829). Type-specimens in Herb. DC. at Geneva. A species founded on Pallas's and Steven's specimens from the Crimea first referred to by Georgi in *Beschr. Russ. Reichs.* iv. 987 (1800), under the name of *C. repens*. This is probably the plant figured by Morison, *Pl. Hist. Univ. Oxoniens.* iii. t. 22, f. 44 (1715). The species seems closely allied to *C. grandiflorum*, from which it differs in the leaves not revolute at the margin, and in the form of the sepals. In recent authentic specimens (*A. Callier*, It. Tauric. ii. n. 46 [1896]), and in others from the Crimea, the leaves seemed to me to be almost acute, not obtuse, as generally stated in descriptions.

In a medium capsule I counted nineteen seeds. Named after Bieberstein, the botanist of the Crimea, who, like Georgi, referred his specimens to *C. repens*. In the specimens examined in Herb. Mus. Brit., which were three on a single sheet from Herb. Auerswald, the only capsules which had split were certainly not exserted beyond the calyx.

47. C. BIFLORUM Kit. ap. Kan. in *Linnæa*, xxxii. 525 (1863). A species near *C. arvense*: a much smaller plant with usually bifloral stems. Found by mountain streams in the county of Szepes, in Hungary.

48. C. BLEPHAROPHYLLUM Ledeb. Fl. Rossica, i. 403 (1842) = *C. longifolium*.

49. C. BLEPHAROSTEMON Fisch. et Mey. ap. Hohenack. Enum. Pl. Talysch, in Bull. Soc. Nat. Mosc. 1838, 403; Boiss. Fl. Orient. i. 722 (syn.); = *C. longifolium*. Not mentioned in Grenier's monograph (1841). Derives its name from the ciliated filaments. According to the authors in the original description, "Species distinctissima habitum *Stellariæ dichotomæ* quodammodo simulat; a proximo *C. dichotomo* et ejus varietate *C. glanduloso* Hort. Berolin. dignoscitur petalis calyce longioribus et filamentis ciliatis. Num *C. longifolium* W.? sed cum descriptione a Willdenowio data, haud quadrat." Though it is here stated that the description does not tally with that given by Willdenow, it applies, however, very well to the authentic specimen in Herb. Mus. Brit. The original specimens were collected by Hohenacker in the Suwant district of the government of Baku, in the Caucasus.

50. C. BOISSIERI Gren. Monogr. Cerast. 67 (1841) = *C. Gibraltaricum* Boiss. (1838). The latter must stand as the name for the species.

51. C. BOMBYCINUM Schur, Enum. Pl. Transsilv. 123 (1866); Nym. Consp. Fl. Eur. 108 (1878); Jacks. Ind. Kew. i. 483 (1893) = *C. alpinum*. This is an example of the unnecessary multiplication of synonyms. No plant of this name has been described or published by Schur or anybody else. It is to be regretted that the vicious method of overstocking his herbarium adopted by the late Prof. Ferdinand Schur and the wholesale issue of still-born names for which he was responsible were pursued with a heedless disregard for the conglomerate mass of synonyms. Schur seems to have gathered specimens, placed them in his herbarium, and, without any serious attempt at discrimination, have dubbed them with new names, and there left them. Subsequently, with further examination of materials for his *Enum. Pl. Transsilvaniæ*, he considerately reduced some, but cited them by the unpublished names written on the labels hurriedly attached to his specimens, which names became synonyms immediately on publication. Instances of these tautological encumbrances are everywhere in evidence in the work mentioned. It is bad enough for some authors to encumber synonymy by publishing herbarium-names which have little or no connection with the history of the species, whose distribution

the specimens examined may not affect; but it is far worse for an author to cite manuscript names from his own herbarium, which serves only to draw attention to his tendency to the indiscriminate multiplication of species. After thus bringing to notice early in this list a category of names which have no sort of status, it is not intended in this series of notes to take further note of names which have been published in this way, though they find a place in the *Index Kewensis*.

52. C. BOSNIACUM G. Beck ex Nym. Consp. Fl. Eur. suppl. 62 (1889), et Hort. Kew. 1898. This plant was described by Prof. Beck v. Mannagetta as a form of *C. tomentosum*; and it is only the faulty compilation of the index to the work in which it is mentioned which misled Nyman into citing it as a species. In the present year some specimens flowered in the alpine house in Kew Gardens, and these living specimens I was able to compare with *C. tomentosum*. From them I have drawn up a brief differential diagnosis of the characters which distinguish the plant from typical *C. tomentosum*. Prof. Beck refers only to the different form of the leaves.

C. tomentosum var. *bosniacum*.—Planta lanugine minus intricatim tomentosâ vestita; folia caulina elliptica vel ovato-elliptica rotundato-obtusa, inferiora ovata; dichasium 6-9-florum; flores centrales erecti, alares nutantes; bracteæ lanceolatæ subacutæ; sepala ovato-lanceolata: *C. Mæsiaco* Friv. simillima, hæc quidem *C. tomentosi* varietas.

Hab. S. Bosnia.

53. C. BRACHYPETALUM Desp. in Pers. Syn. Pl. i. 520 (1805). This is a species of wide distribution in Europe, Asia Minor, and North Africa, and extending eastwards to Siberia, if one may rely on specimens in Herb. DC. labelled "C. ruderale," collected by Fischer, which belong to this species. The geographical area of the species, as to its extreme limits, works out as follows:—

N.—Sweden; Branningeklint, in the lan of Södermanland, lat. 59° (ex *Hartman*, Skand. Flora, ed. 1876, 128. *S.*—Cyprus (*Sintenis et Rigo*, It. Cyprium, 1880, n. 1012). *E.*—Siberia (*Fischer*). *W.*—Spain; nr. Villafranca del Vierzo, in province of Leon (*Lange*), long. 7° W.

If the authenticity of Fischer's Siberian specimens should be doubtful, the eastern limit would be the government of Tiflis, in Trans-Caucasia (*Eichwald*). *C. canescens* Hornem. is reducible to this species, but Royle's specimens thus labelled, collected in Kashmir, belong to *C. triviale*.

54. C. BREVIFLORUM Gilib. Fl. Lithuanica, ii. 158 (1782). I have not been able to refer to a copy of this work, but the following description is from the same author's *Exercitia Phytologica in Lithuania*, p. 298 (1792):—"Caulis simplex seu vix ramosus, triuncialis. Folia ovata, hirsuta; paribus paucis. Flores parvi, longitudine calycis; petala emarginata; stamina 5; styli 3." Ledebour sinks the species in *C. semidecandrum*, ignoring Gilibert's mention of three styles, which is possibly an error. Otherwise,

there is nothing in the brief description to distinguish the plant from *C. semidecandrum*.

55. C. BULGARICUM Uecht. in Oesterr. Bot. Zeitschr. xxvi. 221 (1876); Velen. Fl. Bulgarica, 86 (1891). Political changes have rendered the name of this species a misnomer. When the plant was described, the locality in which the specimens were found was in that portion of the Turkish pachalic of Bulgaria which was afterwards incorporated in the kingdom of Roumania. The species does not occur within the confines of the principality of Bulgaria. It is very near the Spanish *C. Gayanum*, with which the authentic specimens in Herb. Kew. have been compared; and from which it is distinguished by the more compact cyme and the distinctly ribbed character of the calyx.

Hab. Roumania: mountain pastures at Grecii, near the town of Macin, in the province of Dobrudscha.

56. C. BUSAMBARENSE Lojac. Fl. Sicula, 181 (1888). *Ic.* Reichb. Ic. Fl. Germ. Helv. 4984 (*C. repens*).—Lojacono says that at the time he described this plant from very incomplete material, and had not examined fruit-specimens. Recently, however, further specimens in better condition, with ripened capsules and seeds, have been received at Herb. Mus. Brit. from the Sicilian botanist; and these specimens I have compared with good examples of *C. tomentosum*, *C. alpinum*, and others, and have drawn up from them a fresh description. They seem to agree well with Reichenbach's figure of *C. repens*. The species seems closely allied to *C. orbelicum* and *C. apuanum*, both of which some might, perhaps, be disposed to sink in *C. tomentosum*. Lojacono's description is, for the reason mentioned, very fragmentary, and as the species seems to be well defined and marked off from others, I submit the following description from the recent specimens examined, collected in the original locality:—

Obscure virens, glandulosum, superne viscidum. Rami steriles numerosi graciles intricati diffusi teretes repentes non radicantes; rami floriferi inæqualiter stricte cymoso-corymbosi. Folia inferiora spathulata, reliqua sessilia subconnata sparsim albo-villosa adscendo fere lanata lanceolato-linearia vel late linearia acuta. Flores erecti; pedicelli e basi erecti calyce longiores; bracteæ ovales acutæ late scariosæ. Sepala oblonga obtusa late scariosa. Petala obovata retusa calycem duplo superantia. Capsula e calyce vix exserta, oblongo-cylindrica. Semina ferruginea subauriformia tuberculata, margine sulcata, faciebus concava.—A *C. tomentosi* omnibus formis diversa, habitu diffusiore obscure virente, foliis evidenter acutis, petalis retusis, capsula erecta.

Hab. Busambara, in Sicily.

(To be continued.)

BOTANICAL EXCURSIONS IN DONEGAL, 1898.

By H. C. Hart, F.L.S., &c.

(Continued from p. 76.)

Aug. 7.—Followed the Clonmany river up to Meendoran Lake about four or five miles. A most remarkable flood wetted me through and through in about three minutes, and raised the river three feet vertically in half an hour, flooding all sorts of crops. It fell nearly the same in an hour and a half. The lake above, about two miles round, rose six inches in the same time. Along the stream *Salix pentandra* and *S. Caprea* were noted. Lots of *Oreopteris*. River-bank botany was buried in a yellow flood. About the lake shores *Lobelia*, *Isoetes*, and *Carex filiformis* occurred, but of the latter I entertain some doubt. It was not in a fit state for determination, and, further, I was unable to get at it properly, on account of the flood. It is a western plant, appearing for the first time freely in Fanet (like *C. limosa*), and I doubt if it grows in Inishowen. *Rhynchospora alba* is plentiful here. It is rare in Fanet, but common westward. On the shore, bits of a pondweed looking like *prælongus* were blown ashore, but quite indeterminable. Returning I took up the part of the stream the flood drove me from, finding *Lycopus* in two places, and *Carex flava* (*genuina*).

Aug. 8.—Drove to the Mintiagh, south from Clonmany, leaving the car at "Crookeys," the former home of a rebel pike-making blacksmith, with a record. Up Croaghnamaddy (1255 feet), which is a southern prolongation of Slieve Snaght (2019 feet), the highest mountain east of Muckish, in Donegal. Here we are in District II. of Flor. Donegal, *i. e.* South (West) Inishowen. On the summit *Salix herbacea* and *Vaccinium Vitis-idæa* occur freely. Following the high land northward along some low bluffs, we reach Slieve Main with an additional alpine, *Lycopodium alpinum*. At the summit of Slieve Snacht these occur again, and close by *Hieracium anglicum*; and between that and Slieve Snacht Beg, at about 1750 feet, I gathered a very sparing growth of *Lycopodium clavatum*, the highest I have seen it in Donegal. It seems to like drier mountains than the higher western Irish hills. On the summit of Slieve Snacht I was favoured with the most extensive view I have ever had from it, or indeed anywhere that I can recollect.

From Slieve Snaght Beg, a long stretch over tussocky moorland northwards brought me to the source, or near it, of Strass River ("Straid" on the map). From this, after a mile or two, a very heavy scramble down a series of wooded glens, cut through metamorphic schists, and often forming impervious thickets of hazel, gave me no results of interest. In one gravelly margin I saw *Viola canina*, *Gnaphalium sylvaticum*, and *Lastræa Oreopteris*. Not a hawkweed was observed, though a more likely valley could not be found. This was a heavy day's work, and a car to meet me at Strath's Bridge was most welcome.

Aug. 9.—Drove to Strath's Bridge and followed the remainder portion of yesterday's river to its estuary in Trawbreaga Bay.

By the muddy coast by the *Poa maritima* zone, which the people aptly call the "selvage," from the river-mouth eastward occur *Œnanthe Lachenalii* and *Ranunculus sceleratus*. There might be nice plants here, but what the sheep leave the geese gobble up, and most of the brackish pool vegetation is swallowed by ducks, for this is by no means a sparsely peopled district. At the creek of the Donagh river mouth, on a muddy point, left bank (a river from Glentogher previously examined and containing little except *Scirpus sylvatica*) a goodly patch of *Zostera nana* rewarded my search. This is the second Donegal locality. It has one in Kerry, in Wexford, and in Dublin. In another part of this estuary I gathered previously *Z. marina angustifolia*. *Ruppia rostellata* is in many of the brackish pools. By the estuary, near Malin town, a pale yellow ragweed reminded me what a constant colour yellow is, and how effective a white variety would be. Changed my quarters to-night, with great satisfaction and comfort, to Malin town, where I was well cared for at Doherty's, a branch of the capital hotel in Carndonagh, a neighbourhood I have often botanized.

Aug. 10. — Left Malin early and followed the coast northwestward for Malin Head. This was a long and glorious day. At Goorey (three miles) I made a detour into an ivy-clad series of bluffs, where I formerly found *Orobanche Hederæ*. I searched carefully in other parts, and noted nothing except plenty of *Eupatorium* and *Trifolium medium*, the former often white. It has a decided affection for the margin of the sea in Donegal, and all round the west of Ireland. *Agrimonia Eupatoria* is frequent here also. Along the mud flats before opening out of the Malin estuary (on whose north coast I am) *Œnanthe Lachenalii* is everywhere, and evidently specially avoided by cattle, who eat the rushes all around it. Emerging from the mud on to the sandy beach of the Back Strand, which forms the connecting link between the cliff-bound coast of Malin Head and the foregoing estuary, I gathered *Vicia hirsuta*, *Habenaria viridis*, *Euphorbia portlandica*, *Viola Curtisii* and *Mackaiana*, the *Euphorbia* being plentiful. I searched in vain for *E. Paralias*. *Hieracium anglicum* grows on the sandhills and the bluffs above here. *Chenopodium maritimum* is commoner than *Salicornia* northwards. Here I made a detour upwards to Knockglass in search of Dickie's old record "near sea-level at Knockglass" for *Saxifraga umbrosa*, but I failed. He says it is "rare and barren" here (*Flora of Ulster*), words which should not have been omitted in the *Cybele Hibernica* (ed. 2). This is an important locality, the most northern in Europe by a long way for London Pride. A third search (for I was there before) a few days later was also unsuccessful. Along this sandy shore I came upon the most wonderful *Cakile maritima* I have ever seen. It was in great beds, a foot high, making a pleasing mauve effect, visible at a considerable distance. The stout woody root-stems were nearly an inch in diameter, and the sprawling branches, woody, whitish, hard and hollow, were a yard in length. Here I was exactly opposite the Lagacurrey station on Doagh Island for *Crambe*, and my hopes ran high for a few minutes, to no purpose. At the first rocky point

below Knockglass *Crithmum maritimum* has a safe home. Here the scenery becomes very pleasing, and an effort to get a boat to Glasheedy Island, a small rock with some vegetation, a couple of miles to the west, failed on account of the sea being up. Doagh Island would be the place for it, but it is not worth the time, I feel sure. Along the base of these disintegrating rocks, sometimes of a black basaltic nature, many land-plants occur. They are brought down by sheep and detritus from the pastures above. At the base of one dolerite boss I found a nice lot of *Raphanus maritimus*, a rare plant, which has, however, two other Donegal localities, both in Inishowen. It and its cultivated field congener are not very far removed botanically. All along here *Eupatorium* is characteristically common, and samphire, as usual, inaccessible, that within reach being picked. About a mile along the base of these cliffs there is a grand show of *Statice binervosa*. This is C. Moore's old record, "rocks of Dunargas." It is a soul-satisfying haunt for a brilliant form of a very pretty plant. Formerly when I worked this coast the tide was too high to permit access to the base of these cliffs, and I missed several species. Two cheerful sorts of birds enliven these solitary places, the "garrabrack" or oystercatcher, and the strand-curlew or whimbrel. Several grey crows are about too, a fine bird that has decreased in an extraordinary way in Donegal in my memory, not in the least owing to human agency, so far as I can make out.

At Culoort, or White Strand Bay, we reach the western extremity of a valley running N.W. and S.E. across to the north-east side of Malin Head, and almost isolating that fine headland. A small river, the Keenagh, reaches its shore, and by its bank I met a well-known character of the district, fishing. Seeing me searching for plants, he supplied me with some folklore thereof. One statement interested me, that there was a rare spring plant there, on the pasture inside the strand in his farm, which was instantaneously fatal to sheep. But he didn't know what it was. His predecessors knew it, and had got rid of it, but now it had appeared again, and he had seen a perfectly healthy sheep fall dead from it, and its flesh turn black in the course of an hour or two. I asked him to open the next at once, and try to find bits of the plant to be identified.

I had intended to turn back here, but the coast ahead was too tempting to leave. After White Strand Bay there are clayey and fertile low steep banks above the sea. They were, however, so clean grazed, search was useless. At the first strand, a couple of miles on, Ineuran Bay, or immediately after it, there occurred a nice patch of *Mertensia maritima*, and in a gully a little further on, just before the imposing surroundings of Breasty Bay under the extreme nose of Malin Head, *Ligusticum* occurs in some quantity. *Beta maritima* is very large here on the cliffs in inaccessible spots, and even in this northernmost bit of Ireland, fenced in from grazing, it is quite possible a rare plant might be found. As it is, there is nothing more than an inch or two high. Of course the desperately storm-swept nature of the place is partly the cause of this. The adpressed growth that wasn't commoner grasses,

sedges, rushes, or plantains, was often *Anagallis tenella* and *Radiola Millegrana*, the latter being at a maximum here, as about the old signal-tower. Compressed *Erythræa* (*pseudo-latifolia*) abounds too, and *Gentiana campestris*. *Carex extensa* occurs right round the Head. I was interested to see corn-buntings, several pairs, at this inclement limit of Ireland. Here I found an hospitable dame with whom I had once lodged, and after most welcome tea I trudged back to Malin town in heavy rain, and a dark night and a bad road over some ten Irish miles. A heavy day's work.

Aug. 11.—Back to Malin Head by car. Taking up the coast again near the signal-tower, I followed it southwards and eastwards. On the way from the car I observed a good deal of *Carduus crispus* at a place called Lag, which I had passed close to yesterday. Tansy occurred several times along this road. It is one of the most noticeable of thoroughly-established introduced plants. Her Majesty's mail to Malin is the most leisurely conveyance I have ever travelled on. From start to finish it is more or less a revel of chat and chaff. About a mile or less south-east from the coast-guard station is a magnificent growth of *Mertensia*. This I observed in 1882, and recorded in my paper on Inishowen (*Journ. Bot.* 1883). I am happy to say it is at least as extensive as it was at that date. Following the coast cliffs, the scenery becomes superbly grand, and the walking is very good. But there is little to record. Quantities of *Sedum Rhodiola* decorate the shady wet precipices and gully sides, and *Eleocharis multicaulis*, a thoroughly western plant, is here and there commoner than elsewhere so far east in Donegal. An island rock below me, with a boiling surge breaking on it, annoyed me greatly. It could only be reached by boat, but there was a luxuriant plant-growth on it I could not make sure of, of a darkish hue, and I guessed *Atriplex deltoides*. It is close to a grand "Stookaun" or "Stack," Stookaruddan by name, which is an interesting breeding-place. I hope to invade these premises. The cliffs rise rapidly now to about 600 feet sheer, mostly metamorphic Silurian schists or quartzite. Birds are more interesting than plants. Peregrines and ravens inhabit here, and a pair of the latter were scared from a dead sheep, whose eyes and rib-coverings they had devoured. Browsed *Carex binervis* assumes quite a habit of its own, with very rigid and deeply channelled leaves. All three heaths occurred white along here freely, apparently a sea-tendency to some extent. The peregrines appeared to have a second brood, and the female's cry, last off the nest and the bigger bird, has a shriller scream. What a row they kicked up! Further south-east the cliffs become even grander towards Glengad Head. From about three miles to one mile from that point, at a place known as "The Cruach" (Croagh Glengad), they rise to about 800 feet, with a fine steep grassy talus at the base, flanked on the water's edge by very heavy shingle and fallen boulders. Tired as I was, I think I would have descended by one accessible track, but I was thankful to observe the inevitable sheep. Therefore it would be wasted time. Along the very summit-margin of these cliffs I found *Saxifraga oppositifolia* in good quantity in several places, a new record for a

scarce Donegal alpine. As it is, I believe, extinct in Ben Evenagh, in Derry, this is probably its eastern limit in Ireland.

Along some steep grassy slopes here there was a remarkable pattern of absolutely parallel and equidistant pads or tracks, due to sheep-grazing. This curious feature has often been commented upon, and even traced to geological agencies. Another quadrupedal result, in wet moorland, is due to cows, who travel through in search of food, breaking up the sod into tussocks, and finally producing the most diabolical surface possible to walk over. In Mayo I have watched this process, which is usually the result, of course, of many generations of cow-kind.

At Glengad I left the cliffs for home. The lack of gullies along this coast renders them, perhaps, botanically, barren and shelterless. But what might grow on the bases of some of them could only be found out from a boat. An interminably long grassy road fetched me due west off my course, but when I set foot on it I felt I would presently be certain to tread upon *Anthemis nobilis*, and sure enough it was abundant ere long. It is a rather rare or very local plant, and these old packhorse roads are its favourite abode. The name of this place on the map is Lagawollan.

Aug. 12.—Returned to Knockmany to have a further search for London Pride. On the way I explored the hills about Lag, which are infested with rabbits. I found *Carduus crispus* to be quite common here, evidently its headquarters in Donegal. I have found it near Carndonagh (not far off) sparingly, and elsewhere in Donegal only near Belleek, a habitat as far as possible apart from the present, in the county. In steep waste ground of nettles and coarse weeds, *Alliaria officinalis* occurs in quantity. This is also a very rare Donegal plant, for which I had only two other localities in the county, neither of them in Inishowen. *Agrimonia* here grows very large. The form *odorata* was, I think, unmistakable, though the smell was, as usual, a rather imaginary adjunct. The montane silvery form of *Alchemilla vulgaris* is well marked. *Lycopsis* occurs in the potato-fields. A plant or two of poppy have struggled so far north (*Papaver dubium*). *P. Rhœas* hardly reaches Donegal. *Trifolium medium* occurs occasionally. Failing to find the London Pride, I followed the upper margin of the cliffs, beneath which I had walked two days before, back to Culoort, and examined the Keenagh stream up to near its source for about three miles. Being the most northern stream in Ireland, I thought it deserved attention and might yield something creditable. But it wasn't worth it. Its banks are the home of sand-martins in some places, not at all a common Donegal bird. *Œnanthe crocata* occurs here and there; it is quite scarce in many parts of Donegal. A large, branched, coarse *Leontodon*, with very black involucres, agreed with *L. autumnalis* var. *sordida* of Babington. I believe this is a capital trout stream, but I left it in great disgust and a torrent of rain.

Aug. 13.—Drove to Glengad. About a mile from Malin, on the roadside, *Inula Helenium* is an established plant, and nearer Malin is a good patch of *Allium Babingtonii* naturalized. Along the roads in here there is a variety of *Carduus palustris*, of which

I regret I did not secure specimens, but will hope to do so. It is remarkably floriferous, and more branched than the type, with the flowers of a brighter colour, the whole plant stronger-looking, almost as sturdy as *C. crispus*. I do not know *C. Forsteri*. Can this be it? At Portlean, a new fishing quay, I took to the cliffs for Culdaff. The coast here is a low, prettily diversified, rocky one. *Ligusticum* occurs plentifully near Culdaff. Inside the estuary, *Stachys arvensis*, *Lycopsis*, and *Senecio flosculosus*. The umbellifer occurs on both sides of the estuary. I spent the rest of the day botanizing about this pretty fishing village, on the sandhills and about the coast, but got nothing of note, except signally wretched quarters at night.

(To be continued.)

LAMIUM MOLLE Ait.

By James Britten, F.L.S.

This name is reduced by Mr. Jackson in his *Index* to a synonym of *L. purpureum*. Steudel more correctly assigns it also to *L. parietariæfolium* Benth., in this following Bentham, who (*Labiatæ*, p. 512) first placed *molle* under *purpureum* as a variety, but later (*l. c.* p. 739) established his *parietariæfolium* and placed under it "*L. molle* Hortul. et Ait. Hort. Kew. ii. 297 ex parte?" As pointed out by Bentham, two species are on the same sheet in the Banksian Herbarium which is written up by Solander as *L. molle*, and this is the source of the confusion.

The description in the *Hortus Kewensis** runs thus:—

"L. foliis petiolatis subdentatis: inferioribus cordatis; superioribus ovatis.

Lamium parietariæ facie. *Mor.* [Morison] *blæs.* 278.

Pellitory-leaved Archangel.

Nat.

Cult. 1683 by Mr. James Sutherland. *Sutherl. hort. edin.* 181. n. 1.

Fl. April and May.

Obs. Facile dignoscitur foliis subintegerrimis, nec serratis, nec crenatis. *Flores* albi."

This description is amply sufficient to show which of the two plants on the Banksian sheet is intended, for the specimens of *L. purpureum* (although having less deeply crenate leaves than usual) are fairly typical for that plant, and moreover still have a tinge of purple lingering in the flowers; whereas the others, whose affinity with Morison's plant is pointed out in a pencil note by Sir J. E. Smith, agree exactly with the description, and have flowers which were originally white. But a reference to the authorities cited in Aiton places this point beyond doubt. Sutherland's description runs: "Lamium album Parietariæ facie *Hort. Reg. Bles.*: White Archangel with leaves like Pellitory of the wall"; and

* Solander's original description is not among his MSS.

Morison says: "Lamium parietariæ facie: in omnibus Lamio vulgari accedit. Facilè autem dignoscitur, ex primo, intuitu à foliorum cum parietariæ foliis, similitudine" (Hort. Reg. Bles. p. 279 (1669)).

In his Hist. Plant. Oxon. Morison gives a fuller description, and figures the plant: the description runs:—

"Lamium *Americanum album Parietariæ foliis*. Lamio albo vulgari satis accedit, tenuius tamen. *Foliis* marginibus integris donatis, mucronatis. Parietariæ æmulis, perfacile dignoscitur. *Vid. icon. tab. æn.* 11. Virginiæ incola est" (*l. c.* iii. 385) (1699).

Morison's figure, though small, excellently represents the plant. It is not easy to explain the introduction of "Americanum" and of "Virginia" into the description, but there can be no doubt as to what plant was intended.

Plukenet (*Almagestum*, p. 203 (1696)) enumerates and (*Phytographia*, t. 41, fig. 1) figures the plant, and his specimen is preserved in Herb. Sloane (lxxxiii. f. 233). It is mentioned in the *Hortus Cliffortianus* as a variety of *L. album*, and Cliffort's specimen is in the National Herbarium, where, besides the type of Aiton's plant from Hort. Kew. (1781), is an imperfect specimen from Yalden's garden which seems to belong here.

There are numerous other specimens of the plant in the Sloane Herbarium: from "the Physick garden in Westminster, 1687" (H. S. xxv. f. 32); in "a book of dried plants gathered at Padua by John Machionuss a gardner there, which belonged to Dr. Merret, with many specimens and notes of him; from whose son I [Sloane] bought it" (xxix. f. 155); in "George Loudon's Hortus Siccus" (H. S. clxvii. 11, and f. 377); in Miller's Chelsea Garden plants (H. S. ccxxx. f. 9); in Uvedale's Herbarium (H. S. cccvii. 84); and in the volume of Banister's plants "probably gathered by him before he went to the West Indies in the Garden of Oxford & in the fields" (H. S. clxviii. f. 188).

From these references it would appear that the plant must at one time have been frequent in cultivation—a view put forward by Bentham (*Labiatæ*, p. 739) under *L. parietariæfolium*. Bentham's specimen was sent him by De Candolle from the Paris Garden, and his note runs: "Planta in hortis botanicis antiquioribus culta, a *L. vulgato* [*albo*] differt foliis etiam infimis rarissime cordatis, supremis multo angustioribus et sæpius integerrimis et corollis minoribus. An *L. vulgati* var. insignis in hortis orta?" There can, I think, be little doubt that the plant should be referred to *L. album*.

The only wild specimens I have seen are in Hansen's Herb. Slesv. Holst., no. 1028, where it is correctly identified with *L. molle* Ait., and bears the name *L. album* var. *integrifolium* Nolte, which I have not found in print: it is localized: "Unter Zännen, an Wegen u. Deichen; bl. Jun." Mr. Rolfe tells me there are no wild specimens in the Kew Herbarium.

It should probably be mentioned that the phrase "parietariæ foliis" was also applied, though less frequently, to a form of *L.*

purpureum, and the confusion on the sheet of *L. molle* in Herb. Banks may perhaps have resulted from this. It originated, so far as I have been able to ascertain, in Morison's Hist. Pl. Oxon. iii. 385, where the following description is given :—

"*Lamium annuum rubrum Parietariæ foliis.* Ubi sponte nascitur, nobis non compertum. Ex horto Dom Edw. Morgan, prope cœnobium Westmonasteriense, plurimis abhinc annis ipsi comparavimus. Radice, caulibus, floribus, seminibus, modoque crescendi, à vulgari non dignoscitur. Folia dumtaxat discrimen faciunt; quæ inferius locata minora sunt, & paullulum crenata, superiora vero marginibus æqualibus, mucronata & *Parietariæ* æmula apparent, semperque eandem facultatum retinent."

This name is taken up in Hort. Cliffort., where, notwithstanding the excludent word "annuum," it is placed as a variety under *L. album*. Cliffort apparently did not preserve a specimen, nor do I find Morgan's among his plants in Herb. Sloane. Perhaps this may be the plant intended by Ray (Hist. i. 560) under "Lamium Novæ Angliæ Parietariæ foliis," for he says: "In reliquis ad Lamium minus accedit; foliis Parietariæ æmulis ab eodem differt:" and adds "Cantabrigiæ olim in hortulo nostro columus." But all the MS. references to Herb. Sloane added by Solander in the margin of our copy (most of which have been cited above) belong to the white-flowered plant—*L. parietariæfolium* Benth., which = *L. album* var. *integrifolium* Nolte in Herb.

CARNARVONSHIRE MOSSES.

By H. N. Dixon, M.A., F.L.S.

The following species and varieties are additional to those recorded for this county (V.C. 49), in Griffith's *Flora of Carnarvonshire and Anglesey*. Except in one or two cases (where I have given the collector's name), they are of my own collecting on two or three visits during the past ten years. Several varieties and one or two species might be added to the list, but as there is a slight doubt as to the identification, I have preferred to withhold them altogether. It will be seen that several are quite common species which had accidentally escaped observation, or for some similar reason had failed to be recorded, though the list in the above work is in all respects an admirable one, and leaves little room for further additions. I have given a single locality for each, though in many cases several might be cited.

Sphagnum subsecundum var. *obesum* Schp. Llyn Dinas.—*S. acutifolium* var. *læte-virens* Braithw. Penmaenmawr.—*S. intermedium* Hoffm. Snowdon.

Catharinea crispa James. Llyn Dinas.

Polytrichum strictum Banks. Moel Hebog.

Dichodontium flavescens Lindb. Aber.—*D. pellucidum* var. *fagimontanum* B. & S. Llyn-yr-Afon.

Dicranoweisia cirrata Lindb. Beddgelert.
Campylopus atrovirens var. *epilosus* Braithw. Penmaenmawr.—*C. brevipilus* B. & S. Llyn Idwal.
Dicranum fuscescens Turn. Y Foel Fras.
Fissidens Curnowii Mitt. Aber.
Grimmia robusta Ferg. Aber.
Rhacomitrium heterostichum Brid. Llanfairfechan.
Coscinodon cribrosus Spr. Portmadoc.
Tortula princeps De Not. Moel-yr-Ogof (E. Ch. Horrell & D. A. Jones).
Ulota Bruchii Hornsch. Aber.—*U. Hutchinsiæ* var. *rufescens* E. G. Britton. Pont Aberglaslyn.
Orthotrichum Lyellii H. & T. Beddgelert.
Splachnum sphæricum L. fil. Snowdon.
Tetraplodon angustatus B. & S. Snowdon (J. Ll. Williams).
Philonotis cæspitosa Wils. Aber.
Webera albicans Schimp. Snowdon.
Bryum intermedium Brid. Beddgelert.—*B. erythrocarpum* Schwgr. Snowdon.—*B. Mildeanum* Juratz. Llyn-yr-Afon.
Mnium stellare Reich. Aber.
Fontinalis antipyretica var. *gigantea* Sull. Llyn-yr-Afon.—*F. Dixoni* Card. Beddgelert.
Neckera pumila Hedw., and var. *Philippeana* Milde. Pont Aberglaslyn.
Thuidium delicatulum Mitt. Aber; Fairy Glen, Penmaenmawr; Llyn-yr-Afon.
Orthothecium intricatum B. & S. Snowdon.
Isothecium myurum Brid. Aber.
Brachythecium rivulare B. & S. var. *cataractarum* Sauter. Llyn-yr-Afon.
Eurhynchium crassinervium B. & S. Llanfairfechan.—*E. striatum* B. & S. Aber.
Plagiothecium sylvaticum var. *succulentum* Wils. Llyn-yr-Afon.
Hypnum fluitans var. *falcatum* Schp. Y Foel Fras.—*H. exannulatum* Gümb. Snowdon.—*H. uncinatum* Hedw. Snowdon.—*H. cupressiforme* var. *minus* Wils. Aber. Var. *mamillatum* Brid. Llyn-yr-Afon.—*H. dilatatum* Wils. Aber. I have a specimen of this labelled "J. Whitehead, May, 1866, ex herb. H. Boswell"; and another from Boswell himself labelled "prope Aber, H. Boswell." I gather that Whitehead was the discoverer, and possibly Boswell gathered it there at a later date. I have not gathered it in North Wales myself. It is curious that it is not mentioned in Griffith's list.

REPORT OF DEPARTMENT OF BOTANY, BRITISH MUSEUM, 1897.

By George Murray, F.R.S.

The following additions have been made by presentation:—433 plants collected in Somali-land by Mrs. E. Lort Phillips; 162 Bornean Plants by Governor Creagh, C.M.G.; 160 Bornean Plants by Dr. G. Haviland; 681 Idaho Plants by the United States National Museum; 75 Canadian Plants by Dr. Macoun; 75 West Tropical African Plants by R. Webb, Esq.; 21 Australian Plants by Miss J. L. Hussey; 35 Thibetan Plants by Capt. Cordeaux; 136 Jamaica Flowering Plants and 55 Cryptogams by the Hon. W. Fawcett; 150 Philippine Flowering Plants and 2 Fungi by John Whitehead, Esq.; 58 European Plants by Arthur Bennett, Esq.; 87 New Zealand Flowering Plants and 3 Fungi by T. Kirk, Esq.; 133 Australian Plants by F. M. Bailey, Esq.; 26 Orchids and 1 Conifer by Messrs. Veitch; 3 Orchids by Messrs. Lowe; 8 Orchids by Messrs. Sander; 2 Orchids by Messrs. Williams; 2 Orchids by F. W. Moore, Esq.; 5 Orchids by Sir Trevor Lawrence; 1 Orchid by Messrs. Measures; 1 Orchid by E. Ashworth, Esq.; 1 abnormal Orchid by H. Druce, Esq.; 9 Conifers by Dr. Masters, F.R.S.; 38 Australian, Indian, and Cape Algæ by Dr. Braithwaite; 150 Indian Cryptogams by J. F. Duthie, Esq.; 100 Tasmanian Mosses and 1 Flowering Plant by W. A. Weymouth, Esq.; 2 specimens of *Allium* by F. H. Perry Coste, Esq.; 50 North American Mycetozoa by Prof. F. L. Harvey; 1 type specimen of a Minnesota Moss with description and plate by the author, J. M. Holzinger, Esq.; 21 Ceylon Cryptogams by Mrs. Rose Boughton Leigh; 42 Marine Algæ from Western Australia by J. Markwell, Esq.; and single specimens by E. R. Woakes, Esq., W. S. Dun, Esq., Prof. L. H. Bailey, Dr. W. Newton, Lieut.-General Godfrey, F. Townsend, Esq., Colonel Feilden, H. Fisher, Esq., and — Ginnis, Esq.

The following additions have been made by exchange of duplicates:—78 North American Carices from Prof. L. H. Bailey; 798 Indian Plants from Sir George King, K.C.S.I.; 99 Brazilian Flowering Plants and 384 Cryptogams from Africa, Asia, and South America, from the Director of the Royal Botanical Museum, Berlin.

The following specimens have been acquired by purchase:—1010 South African Plants by R. Schlechter; 1180 Costa Rica Plants by Durand and Pittier; 224 Phanerogams and 55 Cryptogams from Persia by Bormüller; 100 Phanerogams from Poland by Woloszczak; 110 Californian Plants by Parish; 438 Phanerogams, 28 Cryptogams, and 40 wood specimens from West Africa by Zenker; 100 specimens of Koehne's Herb. Dendrologicum; 300 European Plants by Schultz; 300 Mexican Plants by Pringle; 100 Gaboon Plants by Bates; 100 Greek Plants by Heldreich; 50 Swedish Plants by Tiselius; 700 Plants from Asia Minor by Siehe; 158 Natal Plants by Wood; 270 Phanerogams and 7 Cryptogams from New Mexico by Heller; 545 Orchids with sketches by Weathers; 150 North American Algæ by Collins, Holden, and

Setchell; 200 North American Fungi by Ellis and Everhart; 250 Fungi by Sydow; 172 North American Sphagna by Eaton and Faxon; 250 North American Lichens by Cummings, Williams, and Seymour; 200 American Algæ by Tilden; 50 Algæ from Florida by Curtis; 50 Colorado Mosses by Holzinger; 275 Cryptogams from Newfoundland and Labrador by Waghorne; 100 Saxon Fungi by Krieger; 25 Parasitic Fungi by Briosi and Cavara; 200 Freshwater Algæ by Wittrock, Nordstedt, and Lagerheim; 100 South European Mosses by Fleischer and Warnstorf; 342 Cryptogams by Brunnthaler; 50 Characeæ by Migula, Sydow, and Wahlstedt; 275 French Mosses by Husnot.

SHORT NOTES.

Psamma baltica Roem. & Schult.—Last year this plant flowered freely at Caistor, Norfolk, and could be seen from the train. In their *Flora des Flacklandes*, now publishing, Drs. Ascherson and Graebner still mark this as a hybrid—*Psamma arenaria* × *Calamagrostis Epigejos*. I know of no locality for *C. Epigejos* nearer Caistor than Filby (eight miles away); and no *C. Epigejos* is known within many miles of the Ross Links station in Northumberland. Of course it may be urged that it has "died out"; but is this scientific arguing? In favour of the hybrid origin may be put, that the two supposed parents are recorded as growing together in mainland Holland on the sand dunes. In the North Sea Islands, out of twenty-three islands *P. arenaria* occurs on all, and *C. Epigejos* on thirteen; while the only island on which *P. baltica* occurs in which *C. Epigejos* is not recorded is Wangeroog.* *P. arenaria* and *C. Epigejos* occur in all six of the Dutch islands of the North Sea; *P. baltica* is wanting only in Ameland. Another way would be to explain our plant as an introduction, but at Ross Links, Messrs. Baker, Fox, Richardson, and Maclagan all deny this; in fact, Mr. Baker doubts whether "ballast" could be discharged there.—Arthur Bennett.

Note on Chinese Plants.—On p. 68 I printed a note on *Saxifraga Gillii*—a name published (without description) in Gill's *River of Golden Sand*, ii. 426 (1880). It may be well to dispose of two other names which appear on the same page of Captain Gill's book, as these have been taken up (one incorrectly) in Dr. Bretschneider's *History of European Discoveries in China*, 735. *Primula Gilii* Britten, *l. c.* (nomen) is probably, as Mr. Hemsley (Ind. Fl. Sin. ii. 42) suggests, a reduced state of *P. sikkimensis*; *Pedicularis ramalana* Britten, *l. c.* (nomen) I have not been able to identify, but the material at my disposal does not enable me to determine whether it is new: as in the case of the other plants mentioned, there is only a single specimen, to which Mr. Hemsley does not

* L. Vuyck, *De Plantengroei der Duinen*, 1898.

refer. This appears in Dr. Bretschneider's work, by a misprint, as *Primula ramalana*. Perhaps it should be stated, in explanation of these *nomina nuda*, that when we supplied Captain Gill with the determinations of his few plants we were not aware that he intended to publish a list of them; nor had I even seen his list until Dr. Bretschneider's encyclopædic work directed my attention to it.—James Britten.

Primula scotica Hook.—In the original description of this plant (Curt. Fl. Lond. t. 133 (1819)) Hooker says that it had been "for some years known in gardens" by the above name, and was at that time cultivated in the Botanic Garden of Edinburgh. From a passage in Loudon's *Gardeners' Magazine*, vi. 713 (1830) it would seem that the name may have been originally given by James Smith, a nurseryman at Monkwood Grove, near Ayr. In a note prefixed to a list of "Varieties of British Plants cultivated and sold" by him, Smith says: "I have put in the *Primula scotica*, as it was I who named it, and, I believe, first detected it as a new British plant. John Dunlop, Esq., brother of the late General Dunlop, of Dunlop House, brought it to me for the *Primula farinosa*, as he supposed he had found a new habitation for it. I said, when I received it from him, I was truly obliged to him for it; for, if not a new species, it was a singular variety: this happened eighteen or nineteen years since." Smith also says: "I have some information that the *Soldanella alpina* is a native of Wales: please let me know if it is generally known as such."—James Britten.

Sussex Plants.—In *Science Gossip* for January, Mr. T. Hilton has recorded *Potamogeton trichoides* Cham. and *Spartina alterniflora* Lois. for Sussex. He has kindly sent me specimens, and I find the *Spartina* is *Townsendii;* it was gathered in Chichester Channel, Aug. 1896, by Mr. Hilton; this is in W. Sussex. The *Potamogeton* is from the neighbourhood of Lewes, E. Sussex, where it was found by Mr. Hilton in 1897. The Rev. E. F. Linton has gathered *Spartina Grovesii* in the Isle of Wight, so that the plant is recorded for three vice-counties.—Arthur Bennett.

Rubus Kaltenbachii in Leicestershire.—Among a number of brambles which I recently forwarded to Mr. Rogers for determination is a plant which he says must bear the name of *R. hirtus* var. *Kaltenbachii* (Metsch). The specimens, which are quite typical, were collected by me last year from the border of Buddon Wood, Leicestershire. Its occurrence in this county is particularly interesting, as it has previously been seen by Mr. Rogers from the south of England only.—A. B. Jackson.

NOTICES OF BOOKS.

Plant Physiology.

Living Plants and their Properties. A Collection of Essays by J. C. Arthur, Sc.D., and D. T. MacDougal, Ph.D. 8vo, pp. ix, 234; with 28 figures. New York: Baker & Taylor. 1898.

Plant Life considered with special reference to Form and Function. By C. R. Barnes. 12mo, pp. x, 428; with 415 figures. New York: Holt. 1898.

Gesammelte Botanische Mittheilungen von S. Schwendener. 2 vols. pp. iv, 453, 419; tt. 26. Berlin: Borntraeger.

Living Plants and their Properties is a collection of thirteen essays selected from popular addresses and articles presented by the authors within the last five years. In order to "meet the requirements of their juxtaposed position," some have been revised and rewritten or amplified "to meet the demands of continuity, clearness, and harmony with current botanical thought." The result is an eminently readable and charming little book, sufficiently popular to be widely interesting without descending to the silly chatter or wild speculation which often spoil the so-called popular scientific book. The philosophically-minded reader will find plenty of food for thought in Dr. Arthur's essays; such, for instance, as that on "Universality of Consciousness and Pain." Though it may be impossible to prove that plants experience pains and pleasures, yet the more we realize that the vitality of plants and animals are comparable phenomena, the nearer we shall be to the correct interpretation of the properties of living plants. Another, "The Right to Live" (no. xi.) supplies a better conception of a plant than that so often conveyed, namely, a seed-bearing machine.

Dr. MacDougal confines himself more to the ascertained facts of plant-life. Manifestation of sensitiveness illustrated by *Mimosa pudica* is the subject of an interesting chapter, admirably helped out by some clear but simple pictures showing the position taken by the leaves under various circumstances. As the essay was written before the publication of Stahl's recent paper on leaf-movements, the most probable explanation of the night-position as preventing deposition of dew, and therefore allowing transpiration to begin with the first sunlight, finds no place. A second suggestive and well-illustrated essay, entitled "Chlorophyll and Growth,' is adapted from a paper read before our own Linnean Society in 1896, on "The Relation of the Growth of Leaves and the Chlorophyll Function."

Besides the figures in the text, which are clear and serviceable, there are two photographic plates illustrating the wild lettuce or compass-plant in its dual function of weed and pole-star. The volume is well printed and neatly bound, and is quite the kind of book for which we could wish wide circulation.

Professor Barnes's *Plant Life* is a more serious book, but not the less useful. In the words of the author, it is an attempt to exhibit the variety and progressive complexity of the vegetative body; to

discuss the more important functions; to explain the unity of plan in both the structure and action of the reproductive organs; and, finally, to give an outline of the more striking ways in which plants adapt themselves to the world about them. Briefly, it is an elementary text-book on a physiological basis, and at the same time a welcome addition to the long list of text-books, good, bad, and indifferent.

The subject-matter is divided into four parts, under the headings "The Vegetative Body," "Physiology," "Reproduction," and "Ecology." Part I. consists of a short introductory chapter on the cell, followed by a series of ten chapters in which the gradual differentiation of the plant-body is traced from the unicellular condition upwards, the last four chapters dealing with the general morphology of the root, shoot, stem, and leaves, as we find them in the higher plants. Part II. treats of nutrition, growth, and movement; and Part III. of the morphology and physiology of reproduction, both vegetative and sexual. Part IV. is an excellent account in eight chapters of the relation of plants to their environment, inorganic and organic. There are also five appendices, comprising directions for laboratory study, for collecting and preserving material, a list of apparatus and reagents, and of reference-books, and an outline of classification. The last is based on the most recent German system elaborated in Engler and Prantl's *Pflanzenfamilien*. The work concludes with a useful index. The text is profusely illustrated with figures borrowed from very various sources, which we are glad to notice are duly acknowledged, and the whole forms a neat and well-produced volume.

The two volumes of Dr. Schwendener's "collected botanical communications," capacious though they be, are not exhaustive. One of his best known pieces of work, that on the constitution of the lichen-thallus, an epoch-making contribution to special morphology, is not included. The reason for this and other omissions is that the author has brought together only those publications which have appeared since his residence in Berlin, that is, between 1879 and 1897 inclusive. This work of less than twenty years makes a goodly show, and speaks well for the energy and devotion of its author. There are in all thirty-one papers, which, except for a few brief additional comments, reappear in their original form, presenting an excellent and solid contribution to the literature of plant-physiology, especially to that of the mechanics of growth and movement; and botanists interested in this phase of the science will be glad to have in one book so many important papers the majority of which it is impossible to obtain in the handy form of the separate copy.

The papers are arranged chronologically under a number of subject-headings. The first, entitled "Trajectory Curves," comprises a paper of thirty pages which have a stern mathematical look. Then follow two communications on "Stomata," in which their structure and mechanism are discussed; then half-a-dozen on "Leaf-arrangement," including researches into lateral outgrowths

generally. The next heading includes investigations into, and criticisms on, the much vexed "ascent of sap" question. A comment, dated 1897, on Messrs. Dixon and Jolly's recent physical explanation of the process, while admitting the great suction-power of the supposed continuous water-film, denies its existence in the conducting tissue. After papers on the "Swelling and Double-refraction" of plant-membranes, we come to the important one on the mechanism of twining stems (1881). Schwendener, it will be remembered, attributed twining to the mechanical result of circumnutation and stem-torsion; phenomena which are both specially characteristic of twiners.

The second volume opens with a discussion on the mechanical stability of plants called forth by Detlefsen's work on the subject. Then follow papers on growth (especially apical), laticiferous vessels, and "mechanical" tissue. A section entitled "Pulvini" deals with the structure and physiological mechanism of these remarkable developments of the leaf-base in plants like *Mimosa*, *Oxalis*, and others, which respond by movement to variations in light-intensity and other stimuli; while the next and last section comprises two recent and important papers by G. Krabbe and the author on subjects allied to this, namely, changes in position of leaves and flowers, and the relation between rate of growth and variations in turgidity.

Finally, it remains only to say that the text is remarkably clear, and that the twenty-seven plates (many of them double) are well reproduced, and form a valuable addition to, and elucidation of, the subject matter.

A. B. Rendle.

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*ARTICLES IN JOURNALS.**

Bot. Centralblatt (Nos. 5–8). — E. H. L. Krause, 'Floristische Notizen.' — (Nos. 5–7). J. F. Zawodny, 'Die Entwickelung der Znaimer Gurke.' — N. J. Kusnezow, 'Der Bot. Garten der Kaiserlichen Universität zu Jurjew (Dorpat).' — (Nos. 6, 7). F. Hildebrand, 'Ueber eine zygomorphe Fuchsia-Blüte.' — (No. 8). B. Nemec, 'Zur Physiologie der Kern- und Zelltheilung.'—O. Kuntze, 'Protest gegen die Schweinfurth'sche Erklärung.' — (No. 9). H. de Vries, 'Ueber die Abhangigkeit de Fasciation vom Alter.'—D. T. MacDougal, 'Transmission of impulses in *Biophytum*.' — O. Kuntze, 'Ueber *Puccinia* und betreffende Magnus'sche Einwände.'

Bot. Gazette (21 Jan.). — E. Warming, 'The Vegetation of Tropical America.'—E. O. Jordan, 'The production of fluorescent pigment by bacteria.' — O. W. Caldwell, 'Life-history of *Lemna minor*.'

Bot. Notiser (2 Feb.). — S. Murbeck, 'Die nordeuropischen Formen der Gattung *Rumex*.' — N. Svedelius, '*Microspongium gelatinosum*.'

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

Bot. Zeitung (14 Feb.).—G. Götz, 'Ueber die Entwickelung der Giknospe bei den Characeen.' — (16 Feb.). H. Solms-Laubach, 'Die *Marchantiaceæ Cleveideæ* und ihre Verbreitung.'

Bull. de l'Herb. Boissier (24 Jan.). — H. Christ, 'Fougères der Mengtze' (concl. : 1 pl.).—H. Schinz, 'Beiträge zur Afrikanischen Flora' (*Leguminosæ & Pedalineæ*, H. Schinz ; *Asclepiadeæ*, R. Schlechter; *Convolvulaceæ*, H. Hallier; *Gramineæ*, E. Hackel).—J. Bornmüller, 'Drei neue Dionysien' (1 pl.). — Id., *Merendera kurdica*, sp. n. — G. O. A. Malme, 'Die Xyridaceen Paraguays.'—G. Schweinfurth, 'Sammlung Arabisch-æthiopischer Pflanzen.'

Bull. Torrey Bot. Club (16 Jan.). — De Alton Saunders, 'Four Siphoneous Algæ of the Pacific Coast' (1 pl.). — A. Nelson, 'New Plants from Wyoming.' — B. D. Halsted, 'Mycological notes.'—H. Ness, *Lacinaria cymosa*, sp. n. (1 pl.).

Erythea (6 Feb.).—G. Hansen, '*Calochorti* in the Sierra Nevada.'

Journal de Botanique (Jan.: received 11 Feb.). — J. Nadeaud, 'Plantes nouvelles des Iles de la Société.' — M. Goldfuss, 'Assise épithéliale et antipodes des Composées.'—O. Kuntze, 'Nomenclature réformée des Algæ et Fungi.'—E. Roze, 'Flore française de Charles de l'Escluse.'

Malpighia (xii. fasc. 7–10: Jan.).—O. Mattirolo, 'Illustrazione del volume 1° dell' erbario di Aldrovandi.' — L. Buscalioni, 'Il nuovo microtomo 'Buscalioni-Becker.' '—O. Penzig, *Prosopis casapensis*, sp. n. — E. Chiovenda, 'Piante nuove e rare della Flora Romana.' — L. Buscalioni, 'Un nuovo reattivo per l'istologia vegetale.'

Nuovo Giorn. Bot. Ital. (Jan.). — A. Baldacci, 'Collezione botanica d'Albania, 1896.'—G. Arcangeli, 'Escursione a Moncioni ed a Brolio.' — P. Pellegrini, 'Funghi della provincia di Massa-Carrara.' — G. Crugnola, 'Analogie fra la flora italiana e quella dell' Africa meridionale.'—A. Pallanza, *Linaria Jattæ*, sp. n. (1 pl.).

Oesterr. Bot. Zeitschrift (Feb.). — R. v. Wettstein, 'Der bot. Garten und das bot. Institut in Prag.' — J. Bornmüller, *Celsia Carmanica*, sp. n. — J. K. Urumoff, 'Zur Flora von Bulgarien.'—F. Arnold, 'Lichenologische Fragmente: Labrador.' — A. Waisbecker, 'Zur Flora des Eisenburger Comitats' (Filices).

Trans. Linn. Soc. 2nd s. v. pt. 9 (Feb.). — G. Murray & F. G. Whitting, 'New *Peridiniaceæ* from the Atlantic' (7 pl.).

BOOK-NOTES, NEWS, &c.

At the meeting of the Linnean Society on Jan. 19th, Mr. A. J. Maslen read a paper on *Lepidostrobus*. After remarking that the late Prof. Williamson's collection of fossil plants in the Natural History Museum contained a number of slides which he had associated with *Lepidostrobus*, but which could not be referred with certainty to the particular vegetative organs to which they belonged, while it was difficult also to refer isolated sections of the same type of *Strobilus* to one another, he explained that the present paper gave

the result of a re-examination of Williamson's slides of *Lepidostrobus*, undertaken at the suggestion of Dr. D. H. Scott. His object and endeavour had been to make out, if possible, at least some distinct forms; but he had found great difficulty in determining whether the observed structural differences in isolated sections were really of specific value or not. He considered it safer to adopt Williamson's *Lepidostrobus Oldhami* for a common type of structure, and by comparison to describe three marked variations. A clearly distinct form he described as a new species under the name *Lepidostrobus foliaceus*.

At the meeting of the Linnean Society of London on Feb. 2nd, Mr. E. S. Salmon read a paper entitled "Notes on the genus *Nanomitrium* Lindb." This genus had hitherto been regarded as cleistocarpous. Examination of fresh specimens of *N. tenerum* showed, however, that the capsules possessed a distinct zone of specialized cells—delicate, narrow, and transversely elongated—clearly marking off the upper part of the capsule as a lid. The same structure was found in the original specimens collected by Breutel, in Mitten's Sussex specimens, and in various continental examples. The remaining four species of the genus were then examined. *N. synoicum* and *N. Austini* agreed with *N. tenerum* in possessing the zone of differentiated cells, and in these species, although no opened capsules were found, the author expressed the belief that a complete separation of the lid takes place in nature. It seemed to him probable that the very thin cell-walls of the zone, which become partly disorganized, aid in affecting the dehiscence. The above-mentioned structure satisfactorily accounted for the regular dehiscence which had been observed by various authors, and figured by Sullivant. *N. æquinoctiale* showed no differentiation in the cells of the capsule-wall, and was truly cleistocarpous. The inflorescence of this species proved to be polyoicous (autoicous+dioicous). In *N. megalosporum*, also, no differentiated cells occurred. Contrary to what had been stated by Philibert, the capsule of this species was found to possess stomata, and generally to show a structure similar to that of *Ephemerum*. The author pointed out that the characters by which *Nanomitrium* had been separated from *Ephemerum* were insufficient, and considered that the former genus should be limited to *N. tenerum*, *N. Austini*, and *N. synoicum*, referring *N. megalosporum* (and perhaps also *N. æquinoctiale*) to *Ephemerum*. The essential character of the genus *Nanomitrium* was the presence of a zone of differentiated cells, by which a regular dehiscence is effected. In conclusion, the author remarked that, since his paper had been written, he had noticed that, in the last part of his *Organographie der Pflanzen*, Goebel had investigated the capsule of *Nanomitrium tenerum*, with special reference to the development of the columella. In one of the figures given of a longitudinal section of a ripe capsule, the differentiated cells of the capsule-wall are shown, and are referred to in the explanation of the plate as the annulus. Nothing further on this point is mentioned, and the dehiscence of the capsule is not referred to.

At the same meeting, Mr. F. W. Stansfield, M.B., read a paper "On the Production of Apospory by Environment in *Athyrium Filix-fœmina* var. *uncoglomeratum*, an apparently barren Fern." This had been effected by cutting off parts of the immature fronds and allowing them to expand during eighteen months in a uniformly humid atmosphere. The result was the production in the ultimate divisions of a meristematic tissue which gave rise to (1) *gemmæ* or bulbils; (2) *prothalli*, producing both apogamous buds and ordinary sexual axes of growth. One of the prothalli had been examined, and found to bear both archegonia and antheridia. On layering the primary fronds produced by apospory, it was found that these readily gave rise to fresh aposporous growths. The ease with which apospory was induced in the primary fronds, as compared with the extreme difficulty in the case of fronds from an older plant, was said to be characteristic of aposporous ferns in general, Mr. Stansfield having observed it in every case (eight in all) in which he had raised ferns by apospory. Assuming the truth of the "recapitulation" theory, he suggested that this fact indicated that apospory was an atavic trait in ferns. Mr. Stansfield's culture was exhibited, and showed the primary aposporous prothalli with fronds of the sporophyte proceeding from them, the latter being layered and having secondary aposporous prothalli, bearing root-hairs, growing from them.

Newspaper botany is always entertaining, but we doubt whether any better example of journalese has ever been produced than the following, which seems to be a popular appreciation of the important work on Sikkim Orchids reviewed in our December number. Comment is unnecessary, and indeed could hardly do justice to this wonderful presentment of facts. It need hardly be said that the extract is from the *Daily Mail* (of Jan. 26), which in matters of this kind has far outstripped all competitors:—

"8,000 NEW ORCHIDS FOUND.

"Details concerning the successful prosecution of the search of Sir George King and Mr. Robert Pantling (of Alnwick) for orchids in a prolific district of the Himalaya have just reached England. The enthusiastic savants, who have been engaged in the search for several years, have discovered and classified almost 8000 new species.

"They have been particularly fortunate in their search in the tropical valleys in the Sikkim Himalaya, one of the most weird and romantic parts of India. There they found the beautiful exotic plants growing everywhere in extraordinary profusion and bewildering variety.

"The supply of these exquisitely fascinating plants will soon be increased, and the botanical followers of the right hon. member for West Birmingham will find their growing demands more easily attended to."

It will probably be long before bryologists in this country are sufficiently numerous to support a periodical of their own, devoted entirely to the study of mosses. This is a serious hindrance to the study, for there is no better stimulus to such a pursuit than a

journal in which beginners may get hints as to methods of work, and which is open to contributions hardly adapted for the more learned periodicals or such as have a wider scope. We may therefore recommend to the notice of such students *The Bryologist*, a small American paper, edited by Dr. A. J. Grout, author of several valuable publications on North American mosses, which is published quarterly by the Fern Bulletin Co., Binghamton, N.Y., at 25 cents a year. So large a proportion of our species are common to both this country and the U.S.A., that even beginners will find much in this little magazine to interest them. For example, out of 203 species given in a key to the North American *Dicrana* in the January number, fourteen are British.—H. M. D.

Mr. Peter Ewing announces for publication a work on "The Topographical Botany of the West of Scotland," to consist of about 200 pages, which will be sent to subscribers post-free for 1s. 2d. Subscriptions should be sent to Mr. Ewing at The Frond, Uddingston, Glasgow.

We are glad to announce the publication of Mr. William Hodgson's *Flora of Cumberland*, which we hope to notice in our next issue.

The last issue (vol. v. part 2) of the *Transactions of the Natural History Society of Glasgow* contains papers on Ayrshire micro-fungi by Messrs. T. A. Scott and D. A. Boyd; "the Mosses of Campsie Glen," by Messrs. James Murray and R. D. Wilkie; a note on Raspberry roots" and a paper on "Limits to the range of Plant-species," by Mr. G. F. Scott Elliot.

We are sorry to note that the *Bulletin of Miscellaneous Information* issued at Kew has again suffered eclipse, no number having appeared since the November issue. We are thus prevented from giving our usual list of the actual dates of publication of the numbers forming the volume for 1898. Meanwhile it is curious to note that "Appendix I. 1899," bearing the date "1899" upon the wrapper, was issued in November, 1898!

In the Cryptogamic Herbarium of Charles Lyell the British Museum has secured a very valuable and interesting possession. Charles Lyell was born (1767) and died (1849) at Kinnordy, in Forfarshire. From 1797 to 1825 he resided at Stoney Cross, in Hampshire, and it was at this time that he rendered his greatest services to botany by studying diligently the mosses, hepatics, and lichens in the New Forest and in Scotland. Sir William Hooker was then elaborating and publishing his beautiful classical work on the *British Jungermanniæ*, which set the hepatics on a footing of their own as a distinct class of plants; and he was in frequent communication with Lyell. How highly he appreciated Lyell's industry and assistance is shown by his dedication of the species *Jungermannia Lyellii* to him, speaking of him as "a gentleman to whose unwearied researches almost every page of this work bears unequivocal testimony, and to whom I am happy in being able thus publicly to express my gratitude and esteem" (Brit. Jung. t. 77).

Further recognitions were the dedication to Lyell of a botanical work by Hooker, of another by Lindley, of the Australian moss-genus *Lyellia* by Robert Brown, of *Orthotrichum Lyellii* by Hooker and Taylor, and *Opegrapha Lyellii* by Sir James E. Smith. In 1825 Lyell returned to his paternal home and devoted himself chiefly to the study of Dante, in connection with which he published two works. It should be added that his eldest son was the distinguished geologist, Sir Charles Lyell (1797–1875). For the acquisition of Lyell's herbarium the British Museum is indebted to the kindness of Mrs. K. M. Lyell and Sir Leonard Lyell. The great value of the collection, which comprises upwards of 1500 specimens, centres in the originals of the types gathered by Lyell, and in the authentic specimens from Hooker, Taylor, Miss Hutchins, George Don, and others.—A. G.

Teodoro Caruel, who died on the 4th of December last, was one of the most distinguished of Italian systematic botanists. He was director of the Botanic Garden at Florence, editor of the *Nuovo Giornale Botanico Italiano*, a man of considerable intellectual attainments, and an elegant classical scholar. Prof. Caruel was responsible for the continuation of Parlatore's *Flora Italiana*, an imposing work, begun in 1848, and still unfinished, as voluminous in bulk as it is luminous in treatment of the subject. His *Pensieri sulla Tassinomia Botanica*, a work published in 1881, is remarkable for the philosophical grasp of the subject, and classical vigour of the style in which it is written. We hope to give some account of his life and work in a subsequent number.

The second part (issued Jan. 20) of Mr. C. R. Orcutt's badly printed and expensive (—1 dollar for twenty-four pages—) *Review of the Cactaceæ of the United States* shows no improvement in any respect upon the first, which we noticed last year (p. 71). The addition of certain coarse and ugly cuts, which apparently come from a seedsman's catalogue, add to the unattractiveness of the work.

Mr. John Lee, who died on the 20th of January, in his ninety-fourth year, was the last surviving representative of the once well-known firm of Lee and Kennedy, who more than a hundred years ago did so much to introduce horticultural and botanical novelties to this country. The *Gardeners' Chronicle* of Jan. 28 gives a brief sketch of the Lees and their work. It is to the kindness of Mr. John Lee that the Botanical Department is indebted for the valuable series of drawings of plants by Francis Masson, to which reference is made in this Journal for 1885, p. 227.

Mr. J. W. Carr publishes a long list of Nottinghamshire Fungi in the Proceedings of the Nottingham Naturalists' Society for 1897–8.

The Messrs. Groves are making steady progress with the new edition of Babington's *Manual*. The printing of Lord de Tabley's *Flora of Cheshire* is practically completed, and this, like Mr. Hanbury's *Flora of Kent*, will be issued in time for use during the coming summer.

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BY

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The Plate illustrating Mr. Lister's article is unavoidably delayed until next month.

No. 436. APRIL, 1899. Vol. XXXVII.

THE

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EDITED BY

JAMES BRITTEN, K.S.G., F.L.S.,

SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM (NATURAL HISTORY)

CONTENTS.

	PAGE
Notes on Mycetozoa. By ARTHUR LISTER, F.R.S. (Plate 398) ..	145
Botanical Excursions in Donegal, 1898. By H. C. HART, F.L.S., &c. (concluded)	152
Relationships of the Indefinite Inflorescences. By E. A. NEWELL ARBER, B.A.	160
Alabastra Diversa.—Part IV. By SPENCER LE M. MOORE, F.L.S.	168
Merionethshire Mosses. By J. E. BAGNALL, A.L.S.	175
SHORT NOTES. — De Chromotaxia in usum Botanicorum et Zoologorum. — *Lamium album β integrifolium* Nolte. — *Psamma baltica*. — N. Hants Plants ..	180
Bibliographical Notes:— XVIII. Francis Bauer's 'Delineations of Exotick Plants.'—XIX. Samuel Curtis's 'Beauties of Flora.' By JAS. BRITTEN, F.L.S.	181
NOTICES OF BOOKS:—	
Flora of Cumberland. By WM. HODGSON, A.L.S.	184
A Manual of the Grasses of New South Wales. By J. H. MAIDEN. — Synopsis der Mitteleuropäischen Flora. Von P. ASCHERSON & P. GRAEBNER. — Graminées. Par T. HUSNOT ..	186
Articles in Journals	188
Book-Notes, News, &c.	189

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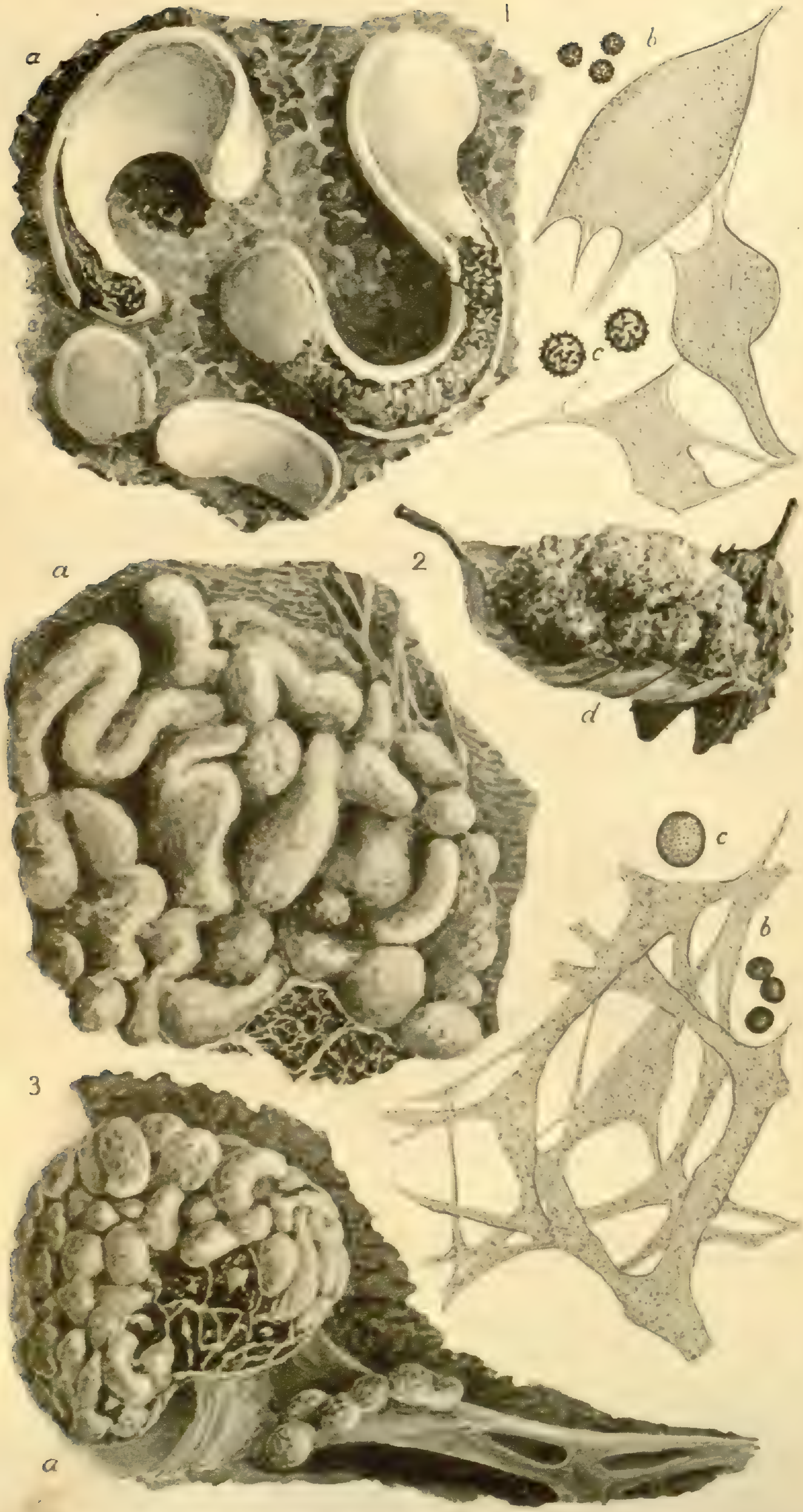

G. Lister del

Mycetozoa.

NOTES ON MYCETOZOA.

By Arthur Lister, F.R.S.

(Plate 398.)

The following notes refer to some interesting species of Mycetozoa that have come under the notice of myself and of my daughter, Miss G. Lister, during the last twelve months.

Badhamia utricularis Berk. In the years 1877, 1887, and 1898 *Stereum hirsutum* grew on logs of oak, beech, and hornbeam in greater luxuriance than in the intervening years. *B. utricularis* feeds mainly on that fungus, and was equally abundant at those periods, but was not generally common in other seasons.

I have maintained cultivations of plasmodium from a gathering in January, 1887, for twelve years, and during that time have allowed some to dry into sclerotium and some to produce sporangia. In these fruitings the spores have shown considerable variation in the looseness or compactness of the clusters they form, but in all of them a cluster consisted of about 7 to 10 spores. In the autumn of 1898, gatherings in Epping Forest and at Lyme Regis had the spores in large clusters of from 10 to 25, such as we usually find in *B. hyalina*. In December, 1898, we gathered plasmodium and also sporangia with spores in large clusters, from a felled beech with a rich growth of *Stereum*. A cultivation was made from the plasmodium, which, as it increased in quantity, was divided into several colonies. Towards the end of February, 1899, three of these changed to fruit; in two the spores were in large clusters of 17 to 25, in the third, consisting of from 3000 to 4000 sporangia, the spores in all examined were in small loose clusters of about 7 to 10. The number of spores in a cluster, hitherto given in the books as a specific character, is thus proved to be inconstant.

B. ovispora Racib. On April 14th, 1898, Mr. J. Saunders gathered this species on straw, at Nether Crawley, Beds. This is the fourth British locality in which it has been found.

B. rubiginosa Rost. The large form with globose sporangia, obtained at Llan-y-Mawddwy, North Wales, in September, 1895,* appeared in profusion in the same situation on a mossy rock in September, 1898.

B. folicola List. During some weeks in October, 1898, this species was in great abundance on the open meadow-land in Wanstead Park, Essex; patches of yellow plasmodium, and sporangia in all stages of growth were scattered over an area of about 100 square yards; they were mostly on tufts of dead *Aira præcox*; it was also found in large quantity on dead leaves, at the spot where it was first obtained in September, 1896,† and in other parts of the park. The sporangia were either sessile or on slender buff-coloured stalks from 0·2 to 0·6 mm. long.

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* Journ. Bot. 1897, 210. † *Ibid.* 209.

PHYSARUM GLOBULIFERUM Pers. Mr. Robert E. Fries gathered this species near Upsala, in August, 1898. It is the finest European example we have seen. The sporangia are white and rugose; the stalks creamy white, with a short conical columella; the capillitium rigid and persistent, with small rounded lime-knots.

P. MURINUM List. This species was found in perfect condition and in great abundance at Llan-y-Mawddwy in September, 1898, on mossy fir stumps. The sporangia were pale mouse-brown with brown stalks; the sporangium-walls had often fallen away, and lay in cup-shaped fragments on the moss; the persistent capillitium retained the globular form; the colour of the lime-knots differs in the growths on different stumps; in some they are pale buff, and in others dark brown. This species agrees in all its characters with *P. globuliferum* except in the colour of the lime; the constancy of the brown colour, however, from different parts of the world, appears to establish a specific distinction.

P. CITRINUM Schum. In July, 1898, we received an extensive growth of this species on moss, gathered by Mr. G. H. Fox, at Glendurgan, Falmouth; the sporangia are of the normal character except that the columella in some is unusually long, often 0·25 mm. in length. In August, 1898, Mr. Cran sent us *P. citrinum*, which he found in great abundance in the Den of Craig, Aberdeenshire, "chiefly on a stump, but also spreading on moss and even earth." This is the first record of its occurrence in Scotland to my knowledge. This species, again, corresponds with *P. globuliferum* and *P. murinum* in all respects except in the colour of the lime, which is bright yellow.

P. VARIABILE Rex. Mr. Fries found this form on dead leaves near Upsala in October, 1897, and again in abundance at the same spot in September, 1898. The sporangia are subglobose, yellow, sometimes shading into orange at the base, rugose with thick deposits of lime in the wall; the stalks vary in colour from yellowish buff to white; they are stout, and densely charged with white lime, without an apparent columella; the spores are similar to those in Rex's type of *P. variabile*, and are decidedly darker than those in *P. melleum* Mass., as represented by our specimens from the United States and the West Indies. Were it not for the dark spores and highly calcareous sporangium-wall, the Upsala gatherings would naturally be placed under *P. melleum*, recent gatherings of which show considerable variation in the colour of the stalks. Indeed, after a careful examination of our series last autumn with Dr. Sturgis, of New Haven, U.S.A., we doubted whether sufficient grounds exist for placing *P. variabile* and *P. melleum* as distinct species. This view is strengthened by the evidence afforded by the Upsala gatherings, which hold an intermediate position between the two. Although *P. variabile* and *P. melleum* are allied to *P. citrinum*, they differ essentially in the large angular lime-knots and weak hyaline threads of the capillitium.

P. COMPRESSUM Alb. & Schw. var. δ. Mr. Saunders collected this form in November, 1898, on dead leaves near Bedford. We have also a very similar growth obtained by Mr. Fries near Upsala,

in September, 1897. In both gatherings the sporangia are nearly globose, though in that from Bedford an almost equal number are compressed; the stalks are either white or dark brown, about 0·5 mm. in length; occasionally two sporangia have the stalks united; the capilitium and spores are of the usual type of *P. compressum*. The var. δ (figured in the Brit. Mus. Catalogue, Pl. xvi.) is common in the United States, and has been described by Mr. A. P. Morgan as a distinct species under the name *P. connexum* Link; the shape of the sporangium constitutes the only divergence from the type, and the specimens under consideration support the view that it is merely a variety of *P. compressum*.

P. echinosporum, sp. n., Pl. 398, fig. 1. Mr. Cran has obligingly sent me specimens of Mycetozoa from Antigua, which have been collected and transmitted to him since he left the island, by Mr. Forrest. They are species already obtained by Mr. Cran, with the exception of one which appears to have been not hitherto described. Although a single gathering, it possesses characters so distinct, especially in the remarkably spinose spores, that, with Mr. Cran's approval, I propose to name it as above; the description is as follows: Plasmodium ? Sporangia chalk-white, usually curved plasmodiocarps, laterally compressed, culminating in a thin ridge, and with the base narrow; sporangium-wall of two layers, the outer smooth, eggshell-like, uniformly charged with minute lime granules; the inner layer membranous, separating from the outer, iridescent, faintly purple; capillitium of short hyaline threads connecting numerous smooth lime-knots of irregular shape and size, consisting of densely compacted minute lime-granules enclosed by a firm faintly purple membrane; spores purple, 8 μ diam., marked with strong spines and ridges. On dead leaves. The species is allied to *P. bivalve*, from which it differs in the more smooth and brittle outer sporangium-wall, the more strict capillitium, and in the strongly echinulate spores.

P. Gulielmæ Penzig. Mr. Fries has kindly supplied me with this specimen, collected by K. Hedbronn, Upsala, 1898 ? on dead wood. It has a superficial resemblance to dark forms of *P. virescens;* the crowded sessile sporangia are rugose, mottled orange-brown in colour, seated on a profuse pale spongy hypothallus; the sporangium-wall is rimose and charged with yellow and brown lime-granules in dense clusters, with intervening hyaline spaces; the capillitium consists of large irregularly shaped white lime-knots connected by a network of hyaline threads; the spores are dark purple-brown, minutely spinulose, 11–12 μ diam. The only specimen we have seen corresponding with this gathering is that obtained by Prof. O. Penzig in Java, described by him in *Die Myxomyceten der Flora von Buitenzorg*, 1898, p. 34. We do not find a double sporangium-wall which is difficult to detect in the Java specimen, nor the "calcareous concretions" which Prof. Penzig refers to as similar to those in the wall and lime-knots of *Craterium leucocephalum;* but as these are not always present in the latter species, it may not be an important character.

Fuligo ochracea Peck. Mr. Fries has submitted to me a specimen of this species, the first we have recognized of European growth. The æthalium has no distinct cortex; the surface is tesselated with the rounded tops of the component sporangia; the capillitium has almost the character of a *Badhamia* in the numerous branching yellow lime-knots, with few connecting hyaline threads; the spores are dark purple-brown, spinose, 9–10 μ diam. This specimen corresponds with those received from the United States, with even less of the hyaline element in the capillitium than in Dr. Rex's type, and with rather smaller spores.

F. ellipsospora List., Pl. 398, fig. 2. In June, 1898, Miss Agnes Fry found the specimen represented in the plate, in a wood at Yattendon, Berks. The gathering consisted of two or three white æthalia, measuring from 1 to 3 cm. across, and more or less connected together; they are without a superficial cortex, and are seated on a white hypothallus spreading in membranous interwoven folds on dead leaves and beech-husks. The walls of the convolute sporangia are membranous, charged with innate clusters of white lime granules; the capillitium consists of a network of confluent white lime-knots with few hyaline threads, and has much of a *Badhamia* character; the spores are violet-brown, minutely spinulose, and almost globose, 10–11 × 9–10 μ diam. A somewhat similar ecorticate form, though consisting of smaller æthalia composed of more compacted sporangia, was received from Mr. F. H. Roberts, of Manhattan, Kansas, in March, 1898 (Pl. 398, fig. 3); it was found on "stipules and leaves of *Quercus Muhlenbergii*"; the capillitium is like that above-described, except that the hyaline threads are more numerous; the spores of both gatherings are exactly alike. The two specimens present considerable difficulty, but I would suggest that they are forms of *F. ellipsospora*, a species not hitherto recorded as British. The objections to this suggestion are the absence of a cortex to the æthalium, and the almost globose spores. With regard to the first objection, it may be remembered that in *F. septica* the cortex is formed by the superficial portions of the sporangia becoming dried before complete development has taken place, and if this species be matured in a moist chamber or under similar conditions in the open air, no cortex is produced, and the component sporangia take a perfect form, giving a brain-like appearance to the surface of the æthalium. May it not be that the absence of cortex in the Yattendon and Kansas specimens is in consequence of development in a moist atmosphere? I should consider the objection that the spores are not conspicuously ellipsoid as a serious one, were it not for the variety we find in the shape of the spores in undoubted specimens of *F. ellipsospora* from America and elsewhere. The following are the measurements of those I have examined:—Type of *Enteridium cinereum* Schwein. (syn. *Physarum ellipsosporum* Rost.), 10–12 × 10 μ; from Aiken, S. Carolina, B. M. 845, 11 × 9·5 μ; from Cuba, type of *Badhamia coadnata* Rost., Strasburg coll., 10–11 × 10 μ; from Java, Penzig, 10 × 8–9 μ (Prof. Penzig's measurement is 13 × 10·5 μ); from Antigua, W. Cran, 11–12 ×

10 μ; from Iowa, Macbride, B. M. 810, 13 × 8 μ; from Ohio, A. P. Morgan, 13 × 9–10 μ; from Philadelphia, Rex, 15–17 × 12 μ. The measurements of the spores given in B. M. Cat., p. 67, are too high for the general range.

Chondrioderma Lyallii Mass. Collected by Mr. R. E. Fries on dead leaves of *Asplenium*, 1000 metres above the sea at Areskultan, Jamtland, Sweden, Sept. 7th, 1898. The specimen corresponds with the type in the Kew collection.

Didymium dubium Rost. This species is in the usual abundance this winter on dead ivy-leaves in the ivy-covered hollow on the Undercliff, Lyme Regis, where it was first collected in this country, to my knowledge, in 1888; it is also not uncommon on dead holly-leaves in other parts of the district.

D. effusum Link var. tenue. This slender plasmodiocarp form was found in the same great abundance on dead leaves in Wanstead Park, as in the autumn of 1896.* The capillitium in all the sporangia examined was purplish brown. In February, 1898 specimens were gathered at Failand, near Bristol, similar in general appearance to those from Wanstead; they are ring-shaped, or long plasmodiocarps with a deep central depression; but the capillitium is colourless, resembling that of the type of *D. effusum*. This gathering supports the view that the form should be considered as a variety and not as a distinct species, notwithstanding the constancy of its characters in Wanstead Park. In "The Myxomycetes of the Miami Valley," Mr. A. P. Morgan has described as a new species "*Didymium anellus*," which from the description appears to be a similar form to the above.

Lepidoderma Carestianum Rost. On a stick, Areskultan, Jamtland, Sweden, R. E. Fries, July 9th, 1898. This species appears to have been only known hitherto from the gathering by Ab. Carestia at Riva (Valsesia), N. Italy, in 1861. It was distributed among various collections through Rabenhorst's Fung. Eur. Exsic. Mr. Fries's gathering is a plasmodiocarp form, generally resembling the type, but the spores are larger, *viz.* 16–20 μ, and the coarse capillitium threads contain vesicles charged with amorphous or roughly crystalline masses of lime similar to those found in Phillips's "*Didymium granuliferum*," from California (B. M. Cat. Pl.xlii A). There can be little doubt that these vesicular expansions of the capillitium are abnormal, for we frequently find them in imperfect developments of *D. effusum*, *D. Trochus*, and in species of *Chondrioderma*. On this supposition I place Mr. Fries's gathering under *L. Carestianum*, and I should take Phillips's specimen to be another form of the same species. It is probably distinct from *L. tigrinum*, but we require more material to arrive at a satisfactory conclusion.

S. fusca Roth. var. flaccida. The form *genuina* of this species has grown for several years in large quantity on a fir-log in my garden at Leytonstone, during the summer months. In December, 1898, a mass of white plasmodium emerged from this log, and,

* Journ. Bot. 1897, 214.

instead of maturing to the usual form with a complete superficial net to the sporangium, it produced slender stalks and a lax capillitium without a definite net, closely corresponding with the var. *flaccida* of *S. splendens*; the spores were typical of *S. fusca*. May it not be the influence of climate that occasioned this form; and may it not explain why the perfect development of *S. splendens* is met with so seldom in this country?

STEMONITIS SPLENDENS Rost. var. β WEBBERI. We have received from Mr. G. H. Fox, of Falmouth, a fine specimen of this variety, gathered by him at Glendurgan on March 10th, 1899. The sporangia are perfectly matured, about 8 mm. in height, with a complete but wide-meshed surface-net of the capillitium, and here and there broad flakes of persistent sporangium-wall. The specimen corresponds in all respects with the type from Philadelphia furnished by the late Dr. Rex. Although *S. splendens* var. *flaccida* is often met with in this country, and was very abundant in the New Forest last summer, this is the only British gathering of the var. *Webberi* we are acquainted with. The var. *genuina*, which is common in hot regions, has not, to our knowledge, been found in England. The gardens in the neighbourhood of Falmouth are celebrated for their half-tropical vegetation, and, if we are correct in the view set forth in the notice of the last species, that the different forms of capillitium in the genus *Stemonitis* may be attributed to the effects of climate, it is not surprising that this more perfect American type should be found in Cornwall.

COMATRICHA LURIDA List. This species has been found plentifully on dead holly-leaves by Miss Margaret Phear, at Witley, Surrey, during the last three winter months; it has also been common in the wooded hollow at Lyme Regis where it was first discovered.

C. RUBENS List. In February, 1899, this inconspicuous species was in great abundance on dead leaves in the wooded hollow just mentioned.

LAMPRODERMA PHYSAROIDES Rost. var. β SESSILE. Mr. Cran has sent from Rhynie, N.B., an interesting sessile form of this species, differing from those referred to in B. M. Cat., p. 126, in the presence of a short columella, and in one instance the rudiments of a stalk. The sporangium-wall is mottled with the usual purplish shades; the capillitium and spores may be considered normal. In November, 1898, Mr. Fries supplied me with a specimen he gathered at Upsala in October of the same year, which I cannot doubt is also a sessile form of *L. physaroides*. The sporangia are irregularly shaped pulvinate plasmodiocarps, with no trace of a columella, but with membranous, iridescent, hyaline walls, and with capillitium and spores corresponding with those of the gatherings of the sessile variety before met with. The typical stalked form was sent from N. Wales in January, 1899, by Miss Roberts, who states that there must have been thirty or forty large growths on moss and fir-stumps, in a glen opening into the upper Dovey valley.

Cribraria violacea Rex. This beautiful but inconspicuous species was found by Mr. Cran at Rhynie, in November, 1898, in fine condition. The specimen corresponds with the type from Dr. Rex, and with the gatherings in Buckinghamshire by Mr. Saunders. It is the third record of the occurrence of the species in Europe.

Lindbladia tubulina Fr. In September, 1898, several æthalia of this species were gathered at Llan-y-Mawddwy, on firwood; they are argillaceous in colour, and the surface is tesselated with the shining membranous tops of the component sporangia.

Trichia verrucosa Berk. Miss Roberts gathered this species at Llan-y-Mawddwy in January, 1899. The specimen resembles the New Zealand type in the sporangia being clustered two or more together on a common membranous stalk about 1 mm. long. It is the second British gathering we know of.

T. affinis de Bary. In February last we received by post from the West of England an immature specimen of this species; it consisted of about 150 newly-formed sporangia on a beech leaf. It was placed in a moist chamber, and in two or three days the central sporangia became yellow, while those on the margin of the patch remained white; eventually most of these acquired the mature colour, but others never recovered from the shock of the journey and dried into hard balls. On examination, it was found that the elaters of the central sporangia were perfectly formed, with regular spiral bands; but in many of those on the margin the elaters were beset with rings and strong scattered spines, the spiral bands being either absent or imperfect; the apices of the threads often terminated abruptly, or were bifurcate with diverging points. The spores associated with both normal and abnormal elaters were of the *T. affinis* type. We have known a growth of this species that had been caught by frosty weather to produce similar abnormal elaters in all the sporangia. This is an instance of how external conditions apart from climate may affect the development of capillitium. To those who are accustomed to collect Mycetozoa and to mature unripe sporangia in a moist chamber, such experience is not unfamiliar. Among species in which variation in the capillitium is frequent, *Prototrichia flagellifera* and *Enerthenema elegans* are examples of great sensitiveness to disturbance. It may, however, be worth while to call attention to the subject, as our books have been cumbered with descriptions of forms held to be distinct species on the ground of some divergence in the capillitium from the usual characters.

T. Botrytis Pers. var. munda.* We have a typical example of this form, gathered by Dr. Sturgis at Shelburne, N.H., U.S.A., in October, 1896.

Hemitrichia chrysospora List. A good specimen of this beautiful species was obtained at Beaminster, Dorset, on the leaves and stalks of ivy, under larches, in February, 1898. The remarkable

* Journ. Bot. 1897, 216.

spores correspond exactly with those of the type. The capillitium consists of long branching elaters, more or less combined into a network: it has not therefore the complete *Hemitrichia* character of the original gathering in November, 1886.

H. INTORTA List. var. LEIOTRICHA was gathered at Witley, by Miss M. Phear, on Dec. 11th, 1898.

ARCYRIA OERSTEDTII Rost. Miss Agnes Fry obtained this species at Failand, near Bristol, in December, 1898. It was first observed in white plasmodium, and in maturity it assumed an unusually brilliant red colour; the papillose plates or persistent portions of the sporangium-wall adhering to the long columns of expanded capillitium are present, as is nearly always the case in this species.

DIANEMA CORTICATUM List. Mr. Cran gathered this species more than once, near Rhynie in December, 1898, on dead wood. The specimens are similar in all respects to the type collected in Norway. It was also obtained by Mr. R. E. Fries, at Angermanland, Sweden, on July 25th, 1898. Beyond these three gatherings there appears to be no record of the species having been found.

DESCRIPTION OF PLATE 398.—1. *Physarum echinosporum*: *a*, sporangia × 20; *b*, capillitium and spores × 280; *c*, spores × 600. 2. *Fuligo ellipsospora*, collected at Yattendon, Berks: *a*, part of a large æthalium × 20; *b*, capillitium and spores × 280; *c*, spore × 600; *d*, æthalium, natural size. 3. *Fuligo ellipsospora*, collected at Manhattan, Kansas: *a*, small æthalium × 20.

BOTANICAL EXCURSIONS IN DONEGAL, 1898.

By H. C. HART, F.L.S., &c.

(Concluded from p. 130.)

Aug. 14.—Followed the Culdaff river up from its mouth. Culdaff lies at the mouth of an estuarine valley which stretches westward to Malin on the Trawbreaga estuary, on the west side of Inishowen. The river flows in a zigzag course through peat-beds lying on an old raised beach—the 20-foot beach—for the last few miles of its course, and at the period when this was sea-level, probably no remote date, outer Malin, as well as Doagh Island and Inishowen itself, were all three isolated. The river is sluggish, and was much swollen by the still continuing heavy rain. Coarse common herbage lined the banks, such as *Aira cæspitosa*, *Petasites vulgaris*, broom, *Avena elatior*, *Equisetum maximum*, *Lythrum*, but nothing of interest occurred. Near Gleneely there is a very perfect "Danish" earthen fort. At Kilcooly Bridge, in Gleneely, I noticed a good settlement of *Sambucus Ebulus*.

In my "Flora of Inishowen" (Journ. Bot. 1883) I made an analysis of the Inishowen plants according to Watson's types, and also a comparison with the Flora of Fanet west of Lough Swilly. Later research, which is embodied in the present paper, and in

the *Flora of Donegal* will modify some of these remarks. The materials for such comparisons are now fully available, and it is not my intention to dwell on them. The flora of Inishowen is chiefly interesting for its introduction, travelling westward across the Foyle, of several boreal and Atlantic species not met with in the north-east, and occurring, as groups, still more plentifully the further west we go. Such are, of the Atlantic group: *Raphanus maritimus*, *Orobanche Hederæ*, *Statice occidentalis*, *Euphorbia hybernа*, *E. portlandica*, *Bartsia viscosa*. Some of these reach north as far as Down, or even the south-east of Antrim, but none can face the austerity of the North Channel coast, or that of North Antrim and Derry. Once Lough Foyle is crossed and Malin Head is rounded, things begin to improve for more delicate species, under the softening surroundings of the Gulf Stream. Lough Foyle forms a biological boundary in several respects.

Of the boreal species (alpine and northern) several might be mentioned, but I have dealt with this subject elsewhere, and this feature is not well marked till we travel farther west than Inishowen.

I will now proceed to enumerate, in proper order, localities additional to those in my *Flora of Donegal*.

The Roman numerals appended refer to the districts in the *Flora*.

Ranunculus trichophyllus Chaix. By a rivulet in Doaghmore Strand, Fanet; III.

R. sceleratus Linn. About Burnfoot, J. H.; II.

Chelidonium majus Linn. Old graveyard. Inch Island, J. H.; II.

Sisymbrium Alliaria Scop. Steep banks above the sea-road at Lag, near Malin town; I. The third locality for a very rare Donegal plant.

Cochlearia grœnlandica Linn. Omitted accidentally from *Flora of Donegal*. North-west coast of Rossgull in several places. Determined by Mr. Bennett. See Journ. Bot. Sept. 1896, p. 399; III. A variety of *C. officinalis* not recorded elsewhere in Ireland. Treated as a species in Lond. Cat. 1895.

Crambe maritima Linn. Grew (according to good testimony) on the strand of Doagh Island, below Lagacurry, in 1895–6. Not seen in the original locality (Norway Point) for about eight years apparently; I.

Raphanus maritimus Sm. Coast below Knockglass, Malin; I. A third locality for a very rare Donegal plant, which is confined to Inishowen in Donegal.

Viola sylvestris Reich. (*V. Reichenbachiana* Boreau). Carrablagh, Fanet; III.

V. Curtisii Forster. Clonmany and Knockmany; I. Below Buncrana Castle, J. H.; II.

V. canina Linn. (*V. lactea* Sm.). Sandhills near Suil Point, Clonmany; gravelly margin of Straas River, below Cloghorna Bridge, Clonmany. Seems to be at least scarce in Donegal; I.

Lychnis diurna Sibth. *L. dioica* Linn. Hedges at Bridgetown, J. H.; II.

L. Githago Scop. Amongst vetches by Effishmore stream, above Cross of Clonmany; I.

Cerastium triviale Link. At 2100 feet on Lavagh More; VIII.

Radiola linoides Roth. Remarkably abundant at the extreme north of Malin Head; I.

Oxalis Acetosella Linn. At 2050 feet on Lavagh More; VIII.

Ulex Gallii Planch. Roadside halfway between Moville and Tremone, J. H.; I. Not unfrequent about Grianan, near Burt, J. H.; II. These two records of Mr. Hunter cover the unnatural gap for the dwarf furze between Derry county and Fanet, where it seems to cease in Donegal.

Ononis repens Linn. Coast below Rinboy Lake, towards Rinboy Point, Fanet; III. The third locality in Donegal. Both of the previous ones are in Inishowen. Sparingly at this new station, and var. *inermis*.

Anthyllis maritima Schweig. West coast of Fanet on the margin of Mulroy, south of Doaghmore strand. "Agrees very well with the description of *A. maritima* Schweig. = *A. Vulneraria* var. *maritima* Koch," J. G. Baker. A very handsome form.

Vicia angustifolia Linn. In a dry pasture-field looking south, between Lough Shannagh and Doaghbeg Barracks, Fanet. A third locality for a very rare plant in Donegal; III.

* *Lotus tenuis* Waldst. & Kit. Introduced and established at Rosapenna Hotel, Rossgull, in new laid grass. Recorded as addendum in *Flora of Donegal*. See Journ. Bot. 1896, p. 399; III.

† *Prunus Padus* Linn. A few bushes half a mile east of Burnfoot, on rising ground. Perhaps introduced, J. H.; II.

Rubus plicatus var. *hemistemon* P. J. M. Magherawarden, at the foot of Knock Alla, in Fanet. A variety with 7- to 9-petalled blossoms. Determined by Rev. Moyle Rogers; III.

Potentilla (*Tormentilla*) *procumbens* Sibth. Common on ditch-banks about Bridge End and on to Galliagh, J. H.; II. Not previously recorded from Donegal.

Agrimonia Eupatoria Linn. Hedge beside the main road between Burnfoot and the Manse; also at Boylett, Inch, J. H.; II.

A. odorata Mill. Lag, near Malin Town; I.

Saxifraga oppositifolia Linn. On the marginal brow of sea-cliffs north of "The Cruach" (Croagh Glengad) at about seven to eight hundred feet above sea-level. Probably the east limit of its existing Irish range; I.

Hippuris vulgaris Linn. Pool near the summit of Inch Top, J. H.; II.

Callitriche autumnalis Linn. In clear drains at Bridgetown and Bonnenaine, Bridge End, J. H.; II.

Peplis Portula Linn. Sandy pools at Dunbery, Bridge End; also marshy ground, Carroreagh, east side of Grianan, J. H.; II.

Conopodium denudatum Koch. At 1300 feet, Gray Mare's Tail, Bluestacks; VIII.

**Myrrhis odorata* Scop. Well established at Bridge Town, Bridge End, J. H.; II.

Crithmum maritimum Linn. Coast a little north of Sessiagh

Bay, on the Mulroy shore of Fanet, with *Euphorbia portlandica*. Very rare in Fanet; III.

Œnanthe crocata Linn. By Keenagh Brook into Culoort Bay, Malin Head; I.

Ligusticum scoticum Linn. Breasty Head, at the extreme north of Malin Head; both sides of Culdaff Bay. I.

[*Daucus gummifer* Lam. Mr. Bennett remarks on specimens from near Sessiagh Bay, Fanet, "about halfway to *D. gummifer* Lam."]

**Sambucus Ebulus* Linn. Roadside, Gleneely Bridge, above Culdaff; I.

**Galium Mollugo* Linn. Introduced in laid-down grass at Rosapenna Hotel. See Journ. Bot. 1896, p. 399; III.

Scabiosa arvensis Linn. Railway banks between Fahan and Inch; II. Field at Boylett, Inch, J. H.; II.

Filago minima Fries. Railway bank north of Fahan Station, east side, immediately after the "cutting"; and at gravel pits near Bridge End Station, J. H. Two new localities for a very rare Donegal plant, not found west of Inishowen; II.

Gnaphalium sylvaticum Linn. Abundant in a field, east side of Grianan, J. H.; II. Near Cloghorna Bridge, by Straas River, Clonmany; I. Like several other northern species, grows commoner westwards.

**Inula Helenium* Linn. Roadside between Malin Town and Glengad; I.

Pulicaria dysenterica Gaertn. "Neds Point," Lough Swilly, in *Flora of Donegal* belongs to II.

Eupatorium cannabinum Linn. Frequent by the west coast of Malin, from Malin Town to Culoort. This species has a preference for sea-gullies in Donegal; I.

Bidens tripartita Linn. By an old lane at Tanderagee, Clonmany; I.

Anthemis nobilis Linn. Plentiful by an old grassy road from Glengad, due west, near Lagawollan; I.

**Tanacetum vulgare* Linn. Roadside between Malin Town and Malin Head, in several places; I.

Senecio Jacobæa (*flosculosus* Jord.). Doagh Island and Culdaff. I. Sandy ground, very sparingly, above Lady's Bay, Buncrana, J. H.; II.

Arctium minus Bernh. Roadside near Clonmany Chapel; I.

Carduus crispus Linn. Tullagh, Clonmany; and Lag, near Malin Town, plentiful. Finds its Donegal headquarters here; I. *C. crispus* × *C. palustris* (?). Between Malin Town and Glengad, by the roadside; I.

C. arvensis (*setosus* Bess.). Cloghorna, near Ballyliffin, Clonmany; I.

Crepis paludosa Moench. Glenhouse Waterfall and Straas River, Clonmany, and along Culdaff River. I. Bridge End Glen, J. H.; II. Apparently the only (and uninteresting) Inishowen representative of the fine group of riverside hawkweeds found in West and South Donegal.

Vaccinium Vitis-Idæa. Summit of Croaghnamaddy; II.

Pyrola media Sw. Heathy places on Inch Top, and sides of Bridge End Glen, J. H.; II.

Statice rariflora Drej. Drumnacraig Bay, below Glinsk, on the Mulroy coast of Fanet; III. This is the first Fanet record, and the eastmost in Donegal. It is also its northern limit; and the next station, after rounding Malin Head and all northern Ireland east of it, is in South-east Antrim, at Larne, In tracking out this range, I find it necessary to apologize for the map my publishers supplied my Donegal Flora with, which was against my selection. It makes Mulroy an inland lake! No doubt it commits other monstrosities.

S. auriculæfolia (*intermedia*) Syme. Rocks north of Knockglass, Malin Head. This is C. Moore's old record, "Dunargas." The form is abundant and beautifully luxuriant here, and Mr. Bennett referred specimens as above. The present locality is its outlying north-eastern and northern limit, and the rock sea-lavender is not met with again round the coast till Louth, in the Dublin district. Var. *S. intermedia* seems to be the commonest form in Ireland, as it is in nearly all the western stations in England.

Anchusa sempervirens Linn. "Near the church at Churchtown," *Fahan*, J. H.; II. Mr. C. Moore's old record in Cyb. Hib., which has been identified as above.

Lycopsis arvensis Linn. Fields at Linsfort, Ballynarry Strand, J. H.; II. This plant seems to be increasing in Inishowen and Fanet.

Mertensia maritima S. F. Gray. Small strand north of Ineuran Bay, Malin Head; and abundant at the old station on the north-east side of Malin Head; I.

Cuscuta Epithymum Murr. Natural ground close to Rosapenna Hotel, Rossgull (the locality is close to some newly laid-down ground). See Journ. Bot., Sept., p. 329 (1896); III.

**Hyoscyamus niger* Linn. A single plant at Greencastle, Inishowen, W. E. Hart (*ante*, 1883). Except for the known waywardness of this species in its appearances, this record would not be deemed worth insertion. Omitted accidentally from Donegal Flora; I.

†*Linaria vulgaris* Mill. Plentiful in a hedge at Elaghbeg, three-quarters of a mile east of Bridge End Station, looking native, J. H. This is the third, and perhaps the best locality in the county for this species; II.

**Mimulus guttatus* DC. Abundant on the banks of a stream between Bridge End and Burnfoot, J. H.; II.

Veronica montana Linn. Plentiful by the Swilly River below Ballymacoole; III. and V. In the glen above Glen House, Clonmany; I. Ditch at Bridgetown, and in wood beside the old castle, Buncrana, J. H.; II.

**Mentha piperita* Sm. Ditches at Cloghorna, near Ballyliffin, Clonmany; I.

Lycopus europæus Linn. By an old (and pretty) lane at Tanderagee, Clonmany; and in two places by the Clonmany River, below the lake at Meendoran; I.

Nepeta Glechoma Benth. Sandhills between Binnion and Suil Point, Clonmany, in two patches of some extent; I. Hedges at Bridgetown, Bridge End, J. H.; II. I have already commented on the unexpected rarity of this plant in Donegal. These two localities make three good ones only, known to me, in the county. At Glinsk, "Between Waters," Fanet, Rev. A. Delap; III.

[*Stachys Betonica* Benth. Recorded in *Cybele Hibernica* (2nd ed.) from "Portsalon" by Mrs. Leebody, who first discovered it in Donegal. I have not seen this second locality (though I live at Portsalon), so am unable to say if it is undoubtedly native. The plant is sometimes introduced as ornamental; III.]

†*S. arvensis* Linn. Cultivated ground by Culdaff estuary, north side (with *Carduus crispus*); I. A plant of very uncertain distribution, and more frequent in Fanet than elsewhere, under my observation, in Ireland.

Lamium intermedium Fr. Near Bridge End, in cultivated ground, J. H.; II.

**Ballota nigra* Linn. Waste ground by cottages (with *Carduus crispus*) facing the sea at Tullagh, Clonmany; I.

Scleranthus annuus Linn. Plentiful in waste ground between Gortnaglar and Kindrum, Fanet. The soil had fallen out of cultivation. The third time of finding in Donegal, but sure to occur in Inishowen; III.

Suæda maritima Dum. Commoner than *Salicornia* northwards, as below Knockmany, Malin Head and elsewhere in Inishowen; I.

Salsola Kali Linn. Shore below the golf links, Buncrana, J. H.; II.

Polygonum Raii Bab. At the Knockalla end of Ballymastocker Bay, Fanet. Shore west of Fanet Point, J. H.; III.

Euphorbia portlandica Linn. Suil Point and Binnion, Clonmany, plentiful; and about Knockglass, Malin Head, abundant; I. Sessiagh Bay and Ballywhooriskey, north-west point of Fanet; III. Does not appear to round Malin Head, and appears next in Co. Down. A distribution parallel to that of the two Statices.

[*Salix Grahami* Baker. (*S. herbacea* × *phylicifolia*?) = *S. Moorei* H. C. Watson? Recorded by Dr. Moore "from amongst moss on the top of Muckish Mountain, 1868" and overlooked in my Donegal Flora. I have spent many hours, on various occasions, doing penance on my knees all over that most unproductive plateau (perhaps a square mile in extent), but could never find this *Salix*, and fear it has disappeared. This locality is so suggestive of *Rubus Chamæmorus*, alpine *Junci*, &c., that it has been most thoroughly thrashed.]

Juniperus communis Linn. Near Culdaff; several bushes, J. H.; I.

Habenaria conopsea Benth. On the Kinnegar, near Rathmullan, J. H.; III.

**Allium Babingtonii* (*A. Ampeloprasum* Linn.). Waste ground near Tullagh, Clonmany; and by roadside to Malin Head, near Malin Town; I.

Sparganium simplex Huds. Ditches near Burnfoot Station, on east side of line; II.

? *Potamogeton prælongus* Wulf. Fragments on the shore of Meendoran Lake, above Clonmany, after a storm. Apparently this species, but material insufficient; I.

P. pusillus var. *tenuissimus* Koch. Small marsh at Lagacurry Strand, Doagh Island, Inishowen; I. Named by Mr. Bennett. Apparently not hitherto noticed in Ireland.

Zostera nana Roth. Slob at the mouth of the Donagh River, at a muddy point on the left margin, plentiful; I. The second locality in the county.

Scirpus fluitans Linn. Ditch leading into the Waterworks, Buncrana, J. H.; II.

S. Tabernæmontani Gmel. By the embankment between Letterkenny Junction and Farland Mill, north side, J. H.; II. Brackish swamp on the "Between Waters," a little north of Roross Ferry; II.

S. (*Blysmus*) *rufus* Schrad. Below Tullagh House, by a little stream, Clonmany; and on Doagh Island, south side; I.

Cladium Mariscus R. Br. Tullyconnell Lake and Gortnaglar, Fanet; III.

Carex dioica Linn. Wet places on the east side of Grianan, Inishowen, J. H.; II.

C. vulpina Linn. Shore of Mulroy at Glinsk, Fanet; III.

C. ovalis Good. South side of Doagh Island; I. Bridge End and Buncrana, J. H.; II.

C. rigida Good. At about 1000 feet on Knockalla (sparingly), Fanet; III.

C. Goodenovii J. Gay. At 1400 feet above Croghanard Lake, Lavagh More; VIII.

C. limosa Linn. "Gamble's Lough," west of Murren, Fanet, accompanied as usual by *C. filiformis*; III.

C. lævigata Sm. Wet glen, a mile south of Bridge End Railway Station, J. H.; II.

C. extensa Good. At the northern extremity of Malin Head, and elsewhere near it; I. Castle River, between old pier and the bridge, Buncrana, J. H.; II. Mulroy, from Roross to Glinsk, Fanet; III.

C. flava Linn. (*genuina*). Stream from Meendoran Lake, Clonmany; I. By Lough Doo, near Rinboy Lake, Fanet; III.

C. filiformis Linn. See under *C. limosa*.

C. ampullacea Good. (*C. rostrata* Stokes) var. *planifolius*. In a dyke out of Lough Doo, a small lake near Rinboy Lake, Fanet. This sedge grows here with the common form, over which it stands conspicuously about twice the size. Mr. Bennett writes, "probably var. *planifolius* of Norman, Fl. Arct. Novegica"; III.

Agrostis pumila (*vulgaris* var.) Linn. Omitted by accident from Donegal Flora. At 1550 feet on Slieve Main, in Inishowen; II. I have met it elsewhere in the county, but omitted to preserve record. It is recorded in Flora of Inishowen.

[*Avena strigosa* Schreb. Casual about Bridge End; II. And Portsalon, J. H.; III.]

Holcus mollis Linn. Bridge End Glen, J. H.; II. Quite rare, apparently, in Donegal.

Catabrosa aquatica Beauv. Brickworks, Burnfoot, abundant, J. H.; II.

Poa nemoralis Linn. Plentiful in Lord Templemore's wood on Inch Island. Recorded as an addendum in Donegal Flora. Discovered by Mr. Hunter; II.

Glyceria distans Wahlb. Farland Pier, south of Inch Island, J. H.; II.

Festuca sciuroides Roth. District II. omitted in Donegal Flora. Frequent there.

F. (*loliacea*) *rottbœlloides* Kunth. Shore at Buncrana, J. H.; II.

F. elatior Linn. Railway embankment near Letterkenny Junction, seven or eight feet high, J. H.; II.

Bromus asper Murr. (*B. ramosus* Huds.). Castle Wood, Buncrana; apparently very rare in II. J. H.; II.

Pteris aquilina Linn. To 1200 feet at Grey Mare's Tail, Bluestacks; VIII.

Asplenium Ruta-Muraria Linn. Unusually common at the Cross of Clonmany; I. Railway Station at Fahan and Buncrana, J. H.; II. Perhaps it is hardly correct to call this fern "scarce" in Donegal, but it is rare apart from old walls, and does not take to the limestone in the south-west as it does in the Burren (Clare) district.

Ceterach officinarum Willd. Sparingly on old approach wall to bridge at Greenfort, foot of Grianan, on the Derry side, J. H.; II.

Hymenophyllum unilaterale Bory. Close to the barren and storm-swept summit of Raghtin More; perhaps the bleakest spot obtainable in Ireland; I.

Aspidium aculeatum var. *lobatum* Swartz. Castle Ross river-glen near Dunree, J. H.; II.

Lastræa Oreopteris Presl. Abundant in Bridge End Glen, J.H.; II. A characteristic plant of the glens of Inishowen from Moville to Clonmany; I.

Osmunda regalis Linn. Still obtained sparingly from Inch, where no doubt it will presently be extinct, J. H.; II.

Ophioglossum vulgatum Linn. Greenfort Island, Carrablagh, Fanet; III.

Botrychium Lunaria Sw. Mulroy shore, between Roross and Glinsk. Fanet; III. Carrowreagh, east side of Grianan, J. H.; II.

Equisetum maximum Lam. Culdaff River, above the village; I.

Lycopodium alpinum Linn. South side of Slieve Snacht at 1750 feet, and elsewhere on this mountain; I.

L. clavatum Linn. North side of Slieve Snacht at about 1700 feet; very scarce; I.

Chara fragilis var. *delicatula* Braun. Tullyconnell Lake, Fanet, very abundant; III.

C. contraria Kuetz. Gortnaglar Lough, near Doaghmore Strand, Fanet; III.

C. aspera Willd. With the last.

C. hispida Linn. With the above. These have been determined through the kindness of Mr. H. C. Groves.

In the above list I am indebted for many localities to Mr. J. Hunter, of Bridge End (J. H.), which have filled up several gaps in District II. (South Inishowen).

RELATIONSHIPS OF THE INDEFINITE INFLORESCENCES.

By E. A. Newell Arber, B.A.

In recent years comparatively little attention has been paid to the study of inflorescences. The entire literature on the subject is not large, and writers in the past have directed their energies chiefly to the elucidation of the definite or cymose type. The equally important problems connected with the indefinite inflorescences, particularly as to their relationships, have been largely, if not entirely, overlooked. It is customary at the present day to regard all indefinite forms as "obvious modifications of the raceme."* As far as I am aware, there has been little attempt made to substantiate this statement. It has been regarded as manifest. The object of this paper is to trace as far as possible the relationships of these inflorescences, and, among other things, to examine the truth of the axiom above stated. An attempt will also be made to answer the question why nearly related species often possess very different inflorescences; a problem which is of especial interest to the systematist.

Self-apparent Relationships.

In this paper only the chief forms of indefinite inflorescences will be dealt with; these are, the raceme, spike, corymb, panicle, capitulum, and the simple and compound umbels. Several of these forms present relationships which are perfectly obvious. The spike, for instance, is related to the raceme, the raceme to the compound raceme or true panicle, the umbel to the compound umbel. The corymb also shows some points of relationship to the raceme, and at first sight also to the umbel. The relationships of the umbel and capitulum are not, however, so self-apparent. But the fact that undoubted affinities exist between many of the forms of indefinite inflorescences is, I think, a strong *a priori* argument in favour of a complete relationship throughout. Taking this into account, I have endeavoured to formulate a theory to fit in as far as possible with the observed facts.

Theory of Internodes.†

In the first place, it will be necessary to examine the factors which determine the form of an inflorescence. These are generally thought to be:—The presence or absence of terminal or axillary floral shoots; the presence or absence of leaves or modified leaves (bracts), and their arrangement; the presence or absence of peduncles of the 1st, 2nd .... nth orders. It is true that these are factors of extreme importance, but they are not the prime factors. As will be seen later, the real causes of the different forms of inflorescence are connected with:—(1) Questions of vital energy; (2)

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* Hooker's Trans. of Le Maout and Decaisne's *System of Botany*, p. 38.

† I have called the principles which underlie the relationships asserted here "the theory of internodes," in order to facilitate easy reference.

physiological adaptation to circumstances. The factors first mentioned are but the expression of these two fundamental causes.

In order to make this point clear, it will be necessary to consider the development of inflorescences in some detail. For simplicity we may study the development and formation of the inflorescence of a plant of simple unbranched habit, such as *Aconitum Napellus* L., the Monkshood. In the spring the plant begins to develop a main stem or rhachis. At the growing point leaves are formed one after the other; the lower ones, being the older, are naturally the first to attain full development. As summer advances there comes a time when, circumstances being favourable, the well-known terminal raceme begins to be developed. If we examine the tip of the rachis after the formation of several floral shoots, the chief point of interest which will be noticed is the relative length of the internodes. Near the growing point will be seen a number of very crowded nodes, some of which—"the highest"—bear modified leaves or bracts, in the axils of which the floral shoots are developing. Below these are similar nodes bearing the last-formed unmodified leaves. At the extreme apex the internodes are so short as to be practically non-existent to the naked eye, but as we descend the stem they become longer and longer. The older the leaf the longer the internode. In this way the flowers and leaves are developed and matured in acropetal succession.

Such an inflorescence owes its form to the development or elongation of the internodes of not only the primary, but also the secondary floral axes. It is obvious that to fulfil both of these conditions the plant must be able to command a considerable supply of vital energy over and above that required to carry on the various other functions of plant life. Further, the energy* required to produce a complicated inflorescence such as the panicle or the compound umbel must be greatly in excess of that required for the formation of a solitary flower. A forest tree or one of the larger herbs, such as *Dipsacus sylvestris* L., *Epilobium angustifolium* L., or *Arundo Phragmites* L., is able to command a far greater supply of vital energy than small alpines, such as *Draba aizoides* L. or *Silene acaulis* L., whose height does not exceed a few inches.

Let us imagine the probable course of events in the case of species whose supplies of energy available for flower production are strictly limited. Alpines are of great interest as affording instances of such plants. Many such are only free from snow for a few weeks in the year, and in this short interval they have to produce the leaf surface necessary for the food supply, and in most cases to store up reserves against the approaching winter. The chief object of such a plant is to reproduce itself: to flower and if possible disseminate its seed before it is again buried beneath the snow. It is easy to understand how important in such cases any expenditure of energy becomes, and how carefully it is husbanded. To such a plant the form of inflorescence best adapted to its needs, and which involves

* The word "energy" is used in this paper in the sense of "the vital energy of a plant of which growth is the expression or result." *Vide* Bailey, *Survival of the Unlike*, p. 25, &c.

a minimum of energy, is, provided the plant tends to branch monopodally, the solitary axillary flower. It is generally agreed that this is the simplest possible type of indefinite inflorescence.*

Next we may consider the case of a (monopodal) plant which has slightly more energy available for flower development than the instance just mentioned. There are two distinct ways in which such energy might be expended with the advantage of an increased production of floral shoots. In the first place, a series of sessile flowers might be produced on the primary axis. If the internodes of the primary axis continued to develop normally, but the axes of the floral shoots remained undeveloped, the resulting inflorescence would be a spike. It is, however, important to remember that, to produce such a form, energy must be expended in two distinct ways, *viz.* the production of a certain number of floral shoots, and the elongation of the primary internodes.

But there is a second method, which would be even simpler. If a series of sessile flower-buds were produced on a primary axis without at the same time elongating the internodes of that axis, the resulting inflorescence would be a capitulum. A capitulum differs from a spike in that the whole of the energy is expended in the production of flower-buds, and none of it is devoted to the internodal elongation of the primary or secondary axes. It is obvious that with the same supply of energy in each case more flowers can be produced by adopting the capitulum rather than the spike. It is also obvious that in either case, if the energy were strictly limited, none of it would be expended on details of secondary importance, such as the elongation of the axes of the floral shoots, however advantageous such might be to the plant.

There are, therefore, apart from the solitary axillary flower, two courses open to such a plant, in one of which the internodes of the floral shoots develop normally—the racemose type, and the other, the umbellate type, in which certain internodes remain undeveloped throughout. It is at this point that the divergence between the two types of inflorescence begins.

Next, we may suppose, for the purpose of simplifying matters, that at a later stage these two forms, the spike and the capitulum, have acquired an additional supply of energy available for flower production. Such energy might be spent in several ways, each being advantageous to the plant. One would consist in the elongation of the secondary axes, transforming the spike into a raceme, and the capitulum into an umbel.

Lastly, the development of a compound raceme from the raceme, and the compound umbel from the simple umbel, can be readily imagined to take place in a similar manner.

All these forms belong to one or other of the two original types. The Racemose, in which all the internodes are normally developed:—the spike, raceme, and panicle. The Umbellate, in which certain internodes remain undeveloped throughout:—the capitulum, umbel, and compound umbel.

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* J. H. Balfour, *Class Book of Botany*, 3rd ed., p. 169.*

There still remain to be considered one or two special cases. In the capitulum a special method may be adopted to find accommodation for a large number of flowers by the formation at the end of the primary axis of a swollen receptacle or torus. As, however, the internodes remain throughout quite undeveloped, we need not consider this modification further here. The corymb appears at first sight to be a connecting link between the raceme and the umbel, as indeed it is stated to be by Kerner;* but if we apply the principles involved in the theory of internodes, this is seen to be a misconception. For the corymb has its primary internodes fully developed, and hence belongs to the racemose type. As will be seen later, this view is supported by evidence from systematic botany.

We may turn now to the evidence which may be brought forward in support of the relationships demonstrated by the theory of internodes; but, before doing so, I wish to lay special stress on one point. It is in no way implied here that any given species which to-day possesses a complicated inflorescence has at some time or another passed through all the stages from a solitary flower upwards. In some cases this may have happened to a limited extent; but the majority of plants were evolved from ancestors, who were able to bequeath to their offspring a heritage of vital energy sufficient to at once maintain any such complicated form as a panicle or an umbel. As to the inflorescence of some far-away primitive ancestor we are not here concerned. The only consideration with which we have to deal is the relationships of these inflorescences, and the causes which have led to their adoption.

The Evidence for these Relationships.

The relationships here presented have the merit of simplicity, and, with one or two exceptions, the links in the chain are fairly obvious. The gradual increase in complexity as we pass along each of the two lines of development, the Racemose and the Umbellate, is in accordance with the axiom that complexity of structure indicates high development. If it were not for this axiom, a complicated form of inflorescence such as the compound umbel might be regarded as *the type*, and all the other forms derived from it. There is, however, no reason to believe that the indefinite inflorescences form any exception to the rule, and therefore a form such as a raceme may be looked upon as derived from the spike.

The non-development of certain internodes in the capitulum and umbel is an anatomical fact. Many authors, Asa Gray† among others, have long ago called special attention to this point. Another fact which has a remarkable bearing on this subject is that in nearly all flowers, with a few exceptions, such as the Passion-flower, &c., the internodes remain undeveloped. If the non-development of certain internodes is characteristic of the flower, it is not surprising that a similar phenomenon should take place in the floral axes of whatever

* Kerner and Oliver, *The Natural History of Plants*, i. 739.

† Asa Gray, *Structural Botany*, § 246, p. 129.

order. It is these two principles—namely, the degree of morphological development and the development or non-development of certain internodes, together with the axiom of the maximum seed-production possible—which form the basis of the theory of internodes.

Considerable support in favour of the naturalness of these relationships may be gained from the facts of systematic botany. Thus it is possible to find all gradations between the solitary flower and the capitulum. Some *Compositæ*, for instance, have many hundreds, even thousands, of sessile flowers crowded into a single head, while in others there are only a few. In *Echinops* (the Globe-Thistles) each true head contains only a single flower. In some species of *Trifolium*, such as *T. alpinum* L., the capitula are few-flowered, while in the majority of species the heads are crowded. That the capitulum is related to the *umbel* is shown in several *Umbelliferæ*, such as *Eryngium*, *Sanicula*, &c., where the inflorescence is a capitulum. In the *Araliaceæ* and *Cornaceæ*, orders nearly allied to the *Umbelliferæ*, the inflorescence is either an umbel or a capitulum.

Many instances might be quoted as to the near relationship of the solitary axillary flower and the members of the racemose family. It will perhaps suffice to mention the *Orchidaceæ*, where the inflorescence is either a solitary flower, a spike, a raceme, or a panicle; and the *Monotropeæ*, where the inflorescence is either solitary, spicate, or racemose. The obvious relationships between the spike, raceme, and panicle need no special illustration; examples may be found in many of the larger families. Lastly, the corymb is related to the raceme, since in most *Cruciferæ* the immature inflorescence is corymbose, becoming, when fully developed, a raceme.

The value of such evidence is not, however, very conclusive, since many nearly related genera, and particularly species, possess inflorescences often very diverse. Such inflorescences may belong not only to the different types of the indefinite group, but also to both the indefinite and definite orders, or to a combination of the two. In the genus *Trigonella*, for instance, the inflorescence of nearly related species may be a solitary flower, a cyme, a capitulum, or a raceme. Apart from the causes which may have brought about these different forms, their development may perhaps be explained somewhat as follows. The inflorescence of all species of Orchids may be looked upon as having developed along the lines of the racemose type only, as demonstrated in the theory of internodes. In the genus *Phyteuma* (*Campanulaceæ*), where the inflorescence is either a spike or a capitulum, development may have taken place in some species along the racemose, in others along the umbellate lines. In the same way, in the genus *Trigonella*, some species may have developed like those of *Phyteuma*, while others again have proceeded along a totally different line of development, the cymose. Mixed inflorescences may perhaps be explained in the same way by assuming that a species has pursued both courses of development, definite and indefinite, at the same time, owing to a capacity for producing both axillary and terminal floral shoots.

Inflorescences as Adaptations.

The greatest support which can be brought forward in favour of the relationships suggested in this paper may perhaps be gained from a consideration of the question why a particular form of inflorescence has been adopted by a plant. It is obvious that the varying forms possessed by nearly related species must have some special significance, and in light of modern research it can hardly be doubted that the explanation is to be found in the study of adaptation to environment. In the last few years great, perhaps the greatest, progress in vegetable biology has been made along these lines. This subject has engaged the attention of many of the greatest continental botanists, who have in the course of their magnificent researches ably expanded the principles which we owe in the first place to Darwin. Much of this work has a direct bearing on the relationships suggested by the theory of internodes.

In many cases one of the chief differences noticed in plants under altered conditions is an elongation or contraction of the internodes. Thus, among the phenomena of etiolation the elongation of the internodes is a fairly constant feature, and has been shown by Godlewski* and by Mr. F. Darwin† to be a form of adaptation to circumstances.

Bonnier,‡ in his researches on the effect of continual illumination on plants, and particularly in his observations on the anatomical and morphological differences between species which grow both in alpine and arctic situations, has shown that one of the chief effects of such continual illumination is a contraction or rather a non-development of the internodes. The development or non-development of certain internodes, which is assumed as the basis of the above relationships, is therefore an extremely likely phenomenon under processes of altered conditions. There can be no doubt that plants do constantly change their habit, and in doing so must come face to face with altered conditions. In the Alps, for instance, many species essentially lowland in origin ascend even to high alpine places, where it is obvious that a very serious change of conditions in the plants' environment takes place. In our British flora there are many instances of species or varieties of plants found along our coasts which differ more or less markedly from the inland mother species. In fact, the whole facies of a marine, an inland, and an alpine flora are altogether different, and it can hardly be doubted that these differences are due to the nature of the habitat of the plant. If this is the case, there is no reason why the inflorescences of a plant should be less liable to modification than any other detail; on the contrary, we learn from Bonnier's researches that internodal changes are most marked under altered conditions. The extreme modification which the flowers themselves undergo, and which have been shown by

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* Godlewski, *Biolog. Centralblatt*, Oct. 15, 1889, &c.

† F. Darwin, Journ. R. Hort. Soc., March, 1896.

‡ Bonnier, Rev. Gén. de Botan. vols. vi. & vii., 1894–5.

Darwin and others to be adaptations for cross-fertilization, is an additional argument in favour of the view that inflorescences form one of the simplest cases of adaptation to environment.

Objections to these Relationships.

I pass now to a brief consideration of the more obvious objections which may be raised to the sequence of these relationships. As has been already stated, most authors regard all indefinite inflorescences as modifications of the raceme. Thus in Le Maout and Decaisne's *System of Botany* the raceme is taken as the type, and the other forms derived from it. The umbel, for instance, is regarded as a raceme whose primary axis is undeveloped; the spike as a raceme whose secondary axes are undeveloped; the capitulum as a spike with vertically thickened and dilated primary axis. In the case of simple and compound umbels, since the outer flowers open first, "we may conclude that the umbel is a compressed raceme."*

In a recent paper on Inflorescences by M. Hy,† the following table is given:—

Principal Variations of the Raceme.

	Peduncles distinct.		*Peduncles short.*
Internodal axes	Elongated.	Raceme.	Spike.
	Very short.	Umbel.	Capitulum.

I have quoted these authors as typical of the views at present accepted, and it is obvious that they are directly opposed to the relationships set forth by the theory of internodes.

The main underlying principle of the at present accepted view is one of vertical suppression or contraction. For example, to get the umbel from a raceme we must have direct contraction of the primary axis, just as one sees illustrated by the shutting up of an extended telescope. "Telescoping," in fact, would take place. Such phenomena are extremely rare in the vegetable kingdom, and I venture to think that the view put forward by the theory of internodes, namely, that the elongation of certain internodes never takes place at all, is preferable to imagining that the same internodes were at one time fully expanded, and afterwards contracted, as they must have done if the umbel was formed from the raceme. It is hardly possible, I think, to interpret Le Maout and Decaisne's words to mean *non-development in the first place*. If, however, they are to be regarded in that light, then we have at once the theory of internodes, and the derivation of all these forms from the raceme falls to the ground. The derivation of all types of indefinite inflorescence from the raceme also involves the development of simpler from more highly organized forms, and this, as has already been pointed out, is far from natural. There is also evidence that the chain of relationships is in many cases closer than any that can be imagined, if these forms are all derived from a raceme.

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* Hooker, *ibid.* p. 38.

† M. F. Hy, Rev. Gén. de Bot. vols. vi. & vii., 1894–5, p. 391, &c.

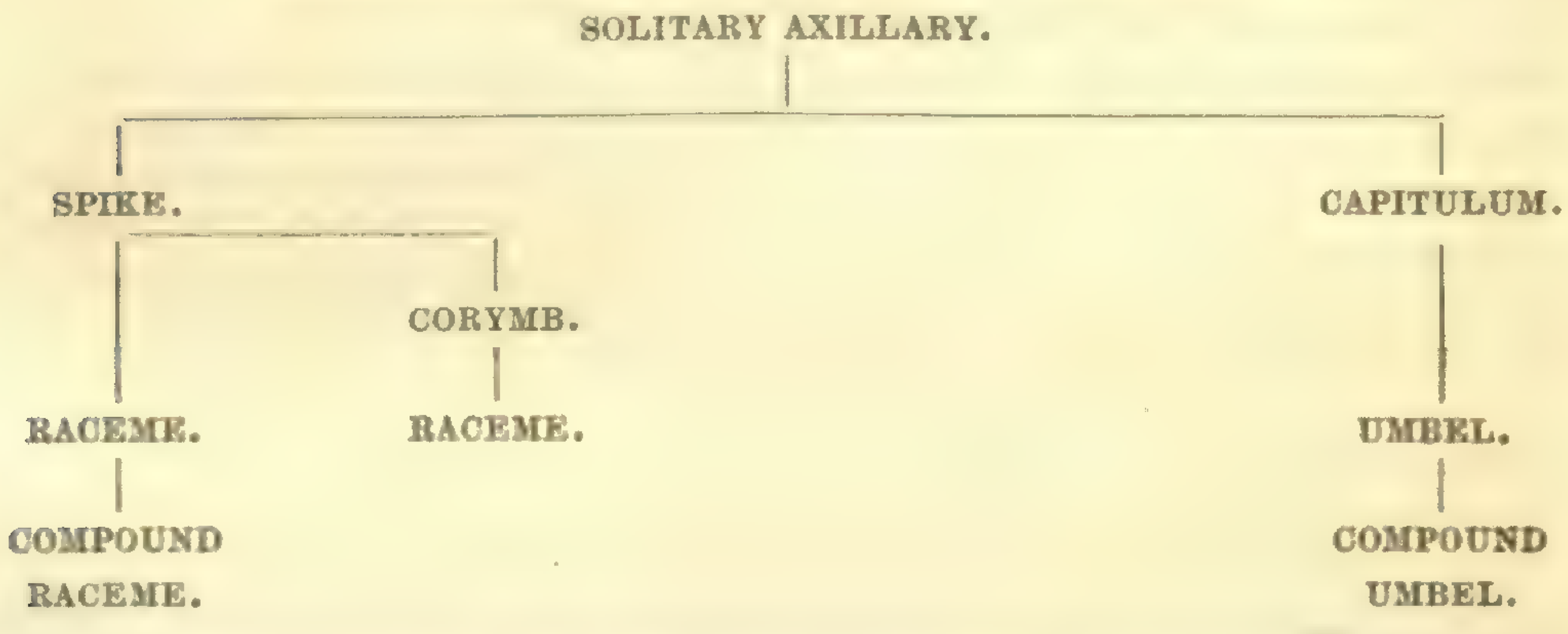
Lastly, with regard to some of the weak points in the relationships alleged in this paper. The affinities of the capitulum are not perhaps so clearly marked as some of the other relationships, but the parallelism between the capitulum and the spike, and between the umbel and the raceme, as indicating the same degree of development along different lines, is an argument in favour of the position assigned here. The evidence of systematic botany is also strong, and several writers have more than hinted at the fact. Thus Asa Gray* says: "An umbel with pedicels much abbreviated passes into a head, such as *Eryngium*, &c."

The reasons for regarding the solitary flower as related to both the spike and capitulum have been fully dealt with in the theory of internodes. It has been shown there that these are the two next simplest types, and, granted the two lines of development, the naturalness of the step is evident.

With regard to the two lines of development, I may add that several authors have arrived at practically the same conclusion, approached from quite different points of view. Vines† classifies simple indefinite inflorescences:—(α) With an elongate main axis: the spike, spadix, and raceme. (β) with a short main axis: the capitulum and umbel. Goebel‡:—(α) Spicate inflorescences with an elongate rachis: the spike, spadix, and raceme. (β) Spicate inflorescences with a shortened rachis: the capitulum and umbel.

If, on the other hand, it is to be believed that all these forms of inflorescence can be traced along a single direct line of descent, and that, as Kerner asserts, the corymb is intermediate between the umbel and the raceme, then the relationships must be as follows:—Solitary axillary—capitulum—simple umbel—corymb—raceme—panicle. In this sequence it is obvious that the spike, a highly important form, has no place. That such a classification is neither in accordance with the observed facts, nor with the principles involved, I have endeavoured to maintain in this paper.

Relationships of the Indefinite Inflorescences.



* Asa Gray, *Structural Botany*, § 275, p. 147.

† Vines, *Text Book of Botany*, p. 490.

‡ Goebel, *Outlines of Classification, &c.*, p. 407.

ALABASTRA DIVERSA.—Part IV.

By Spencer Le M. Moore, F.L.S.

(Continued from vol. xviii. p. 8.)

Eurya amplexicaulis, sp. nov. Fruticosa, glabra, caule folioso satis valido tereti leviter undulato-geniculato, foliis amplis brevissime petiolatis late ovatis basi cordatis necnon amplexicaulibus apice breviter cuspidatis obtusis serrulatis nitidis egregie reticulato-nervosis, floribus unisexualibus mediocribus brevissime pedunculatis, stylis florum a nobis scrutatorum 4 liberis.

Hab. Mt. Dulangau, Mindoro; *John Whitehead* (Herb. Brit. Mus.).

Caulis 0·3–0·4 cm. diam., apicem versus parum miniatus, rubescens deinde plus minus cinereus, lenticellis minutis eminentibus copiose instructus. Folia coriacea, plerumque 8·0–11·0 cm. long. (necnon minoribus 2·0–3·5 cm. long. hac atque illac intercalatis), juxta medium 4·0–6·0 cm. lat., subtus pallidiora; costa media pag. sup. impressa, pag. inf. maxime eminens et rubescens et transversim rugulosa; petioli 0·2–0·4 cm. long., validi, rubescentes. Fasciculi 2–3-flori. Pedunculi 0·1–0·2 cm. long., subtiliter pubescentes. Flores 0·6 cm. diam. Sepala rotundata, margine breviter membranacea, 0·25 cm. long. Petala deorsum connata, late obovata, retusa, 0·6 cm. long. Ovarium subglobosum, 0·23 cm. long.; styli recurvi, 0·12 cm. long. Bacca et flores masculi haud obvii.

The affinity of this seems to be with *E. Macartneyi* Champ., from Hong Kong; but it can readily be distinguished from all species of the genus by means of the amplexicaul leaves. The details of the floral structure—of the female flowers, that is—are in close agreement with those of *E. Macartneyi*, as shown in Seem. Bot. Herald, t. 74, except that the flowers I examined have four styles, whereas the styles of the other are described as being either three or four in number.

Nidorella ? pedunculata Oliv. in James & Thrupp, *Unknown Horn of Africa*, 319. Professor Oliver was led to attach a query to the genus of this plant on account of the larger and less congested capitula, which give it a somewhat different appearance from other Nidorellas. I have recently dissected the flowers of the species under notice, two specimens of it, collected by Mrs. Lort Phillips in Somaliland, having been, a few months ago, presented to the British Museum. Like Professor Oliver, I failed in finding any floral characters to separate it from *Nidorella*; the only additional feature noticed by me being that the ligules of the ray-florets are longer than usually obtains in the genus. The interesting point is that, while one of the two specimens just alluded to is exactly similar to the type-specimen at Kew, the second of them looks decidedly more like a *Nidorella*, inasmuch as its somewhat smaller heads are more congested than are those of the other. I can not, however, see any ground for distinguishing this second specimen even by a varietal name.

CENTAUREA VIRGATA Cav. Ic. tab. 230. This is referred by authors (*e. g.* De Candolle, Prod. vi. 583; Nyman, Conspectus, 427; Willkomm & Lange, Prod. Fl. Hisp. ii. 156) to *C. cærulescens* Willd., a member of the § *Acrolophus*. Among a large number of *Compositæ* recently incorporated into the collection at the British Museum is Cavanilles' type of *C. virgata*, which, instead of being *C. cærulescens*, is really *C. intybacea* Lamk., belonging to the § *Cheirolophus*. From this it might be supposed that the figure is very bad; but such is by no means the case. The mistake made by the artist consists in carrying the ciliation too far down the sides of the involucral leaves, and this it is which has caused the plant to be wrongly placed in the genus. But for this slight though unfortunate blunder, the figure is really a fair one.

CENTAUREA CANARIENSIS Brouss. in Willd. Enum. Hort. Berol. 928. Three specimens of this extremely rare plant are in the British Museum Herbarium. All are labelled Teneriffe, and two of them, dated 1812, are Broussonet's own types. In an interesting collection from the Canary Islands purchased by the Museum from the Rev. R. P. Murray, of which a number of specimens have been passing through my hands, is a *Centaurea* with capitula exactly like those of *C. canariensis*, but its leaves, instead of being pinnatifid, show no sign of division. I therefore propose to distinguish it as :—

Var. INTEGRIFOLIA, var. nov. Folia oblanceolata, in petiolum alatum ima basi leviter ampliatum desinentia, deorsum remote denticulata, circa 5·0 cm. long., juxta medium 0·8–1·3 cm. lat. Teneriffe, June, 1895; *Rev. R. P. Murray* (Herb. Brit. Mus.).

The Kew Herbarium has no specimen answering to the type form, but, on looking through the Canary Islands Centaureas there, I recognized the above-described variety (Orotava; *Gustav Mann*, Nos. 2459, 2479 in Herb. Kew.).

Centaurea (§ PLECTOCEPHALUS) **Bridgesii**, sp. nov. Fruticulosa ?, erecta, parce ramosa, scabriuscula, ramulis strictis deorsum foliosis sursum nudis, foliis mediocribus sessilibus subdistanter pinnatisectis 5–6-jugis jugis anguste linearibus nec revera rhachide angustioribus, capitulis ramulos elongatos singillatim coronantibus late campanulatis glabris, involucri phyllis oblongis exterioribus in appendicem scariosam stramineam pectinato-partitam productis intimis quam exteriores longioribus apice membrana scariosa pectinato-ciliata coronatis.

Hab. Coquimbo, Chile; *Bridges*, No. 1397 (Herb. Brit. Mus.).

Planta saltem 30 cm. alt., verisimiliter altior. Radicem non vidi. Caulis ligneus, sursum obtuse angulatus, in longitudinem egregie striatus, 0·25 cm. diam. Internodia solemniter circa 1·0 cm. long. (ramuli vero unici juvenilis brevissima). Folia 5·0 cm. long., pleraque vero breviora, in sicco olivacea, eorum lobi 0·5–1·5 cm. long., foliorum summorum revera miniati. Capitula 3·0 cm. diam. Involucri phylla extima 0·2–0·4 cm. long.; interiora circa 0·8 cm. long. et 0·2 cm. lat., eorum appendix 0·17 cm. long. et (ciliolis inclusis) 0·4–0·5 cm. lat., ciliola utrinque 4–5, debilia; phylla intima 2·0 cm. attingentia, margine hyalina, interioribus sub-

æquilata; phylla omnia plane in longitudinem pluristriata. Flosculi 3·5 cm. long., verisimiliter albi. De reliquis inquirendum.

Apparently allied to *C. chilensis* Hook. & Arn., though the involucral scales show a decided approach to the § *Cheirolophus*. The habit is that of *C. chilensis*, but the leaves are more scattered and their lobes slenderer; the capitula also are smaller and relatively longer. The narrow involucral leaves serve to distinguish it at once from *C. chilensis*. The Museum specimen having but one mature capitulum, and that only in flower, it has been thought better not to remove a floret, as the head might thereby be injured at the insufficient cost of getting a sight of the immature achene and pappus.

Carbenia benedicta Adans. (*Cnicus benedictus* L.). A small but, to botanists, interesting result of the "forward policy" in India is the inclusion of this plant in the flora of British India. A specimen collected by Surg.-Lieut. Harriss, I.M.S., in the Dir Valley (Chitral Relief Expedition, 1895, No. 16281), is in the British Museum, and, coming from so isolated a spot, is not at all likely to have been a cultivated one.

Crepis (§ Glomeratæ) **Gillii**, sp. nov. Subacaulis, caule crasso sparsim folioso mox furcato araneoso, foliis oblongis sinuato-lobatis vel subruncinatis obtusis plantæ ipsæ subæquilongis summis sc. iis ipsis sub pedunculis insertis filiformibus, capitulis numerosis congestis anguste cylindricis glabris vel fere glabris pedunculis complanatis ea subæquantibus suffultis, involucri phyllis exterioribus 1–3 quam interiora 4 oblonga vel ovato-oblonga obtusissima brevioribus, achæniis oblongo-ovoideis sursum brevissime sed eximie attenuatis eminenter 10-costatis pappo stramineo coronatis.

Hab. Rā-mā-lā Mountain, W. China; *Capt. Gill*, Aug. 1877 (Herb. Brit. Mus.). Also W. China; *Pratt*, Nos. 456, 482, 875 (Herb. Kew.).

Tota planta 6·0 cm. alt. et totidem diam. Caulis usque ad 1·0 cm. diam., ejus ramuli sub floribus parum ampliati. Folia inferiora usque ad 5·0 cm. long., modice 1·0 cm. lat., scabriuscula, ciliolata, eminenter 1-nervia; folia summa 2·0–2·5 cm. long., deorsum ampliata ibique decoloria, puberula. Pedunculi 1·0–1·5 cm. long., usque ad 0·15–0·23 cm. complanati, glabri vel puberuli. Involucri glabri vel puberuli 1·5 cm. long. vix 0·3 cm. diam. phylla exteriora filiformia, basi leviter ampliata, 1·0–1·2 cm. long.; phylla interiora 2 oblonga 0·3 cm. lat., 2 ovato-oblonga 0·5 cm. long. semi-amplectentia, omnia margine hyalina, sursum atrata. Corollæ tubus 1·0–1·3 cm. long.; ligulæ anguste oblongæ, luteæ, deorsum in sicco atratæ. Antheræ 0·5 cm. long., basi setaceo-appendiculatæ, in sicco atratæ. Stylus ad 0·17 cm. supra antheras exsertus, una cum ramis crebre papillosus. Achænia 0·2 cm. long., 0·15 cm. diam., basi leviter attenuata, sursum in collum distinctum 0·05 cm. long. attenuata.

Closely allied to *C. glomerata* Decaisne, from which it differs by reason of its less araneose stem, the greatly flattened peduncles, the longer and relatively narrower capitula, longer inner involucral

leaves, of which there are, at least in Capt. Gill's specimen, always four, the two exterior considerably narrower than the two interior; and lastly the achenes, which are smaller than and differently shaped from those of *C. glomerata*, and much more markedly costate and beaked than they are.

The largest Kew specimen is about 8 cm. high, and nearly 9 cm. in diameter at the top.

Lactuca Watsoniana Trelease. The identity of a plant alluded to in Mr. H. C. Watson's list of Azores Plants (Hook. Lond. Journ. Bot. iii. 615 (1844)) as a "larger-leaved plant, probably a *Compositæ*," has never been cleared up. In Godman's *Azores*, Mr. Watson wrote (p. 187):—"Another *Lactuca*, of uncertain specific name, is mentioned by Drouet [*Flore des Iles Açores*, p. 98] as inhabiting the Caldeira in Fayal. This may be the larger-leaved Composita mentioned at the end of my former catalogue." In 1896 appeared Professor Trelease's *Botanical Observations on the Azores*, and there (on p. 127) is shortly described, and in tab. 39 is figured, a large-leaved *Lactuca*, to which is applied the name *L. Watsoniana*, Professor Trelease remarking that it appears to be the Composite referred to by Watson and by Drouet. This surmise turns out to be correct, for Drouet's own specimen, which agrees perfectly with Trelease's figure, is in the British Museum Herbarium. Moreover, on looking through the undetermined *Compositæ* at the Museum, I was fortunate in finding an old specimen, collected by Masson at Fayal in 1777, which Mr. Britten and I at once recognized as *L. Watsoniana*. To the fact of this specimen being without flowers is doubtless due its relegation to the end of *Compositæ*, a very good "shot" at the natural order having been made. The leaves of Masson's specimen are larger than those of Drouet's, the largest reaching 20 cm. in length by 18 cm. across at the widest part. The longest petioles are no less than 24 cm. long. This very fine plant I could not find in the Herbarium at Kew.

Aptosimum Randii, sp. nov. Pilis patulis hirsutulo-pubescens, ramulis ascendentibus abbreviatis dense foliosis, foliis elongatis anguste lineari-oblanceolatis in petiolum brevem gradatim desinentibus apice pungenti-apiculatis membranaceis in sicco læte viridibus, floribus subsessilibus, bracteis linearibus calyci subæquilongis, calycis brevissime tubulosi lobis linearibus corollam semiæquantibus, corollæ tubo deorsum attenuato mox ampliato ipso sub limbo iterum leviter attenuato ejus lobis inter se subæqualibus, staminum anticorum antheris eas stt. posticorum duplo excedentibus, capsula obovoidea sursum compressa ibique pubescente.

Hab. Buluwayo; *Dr. R. Frank Rand*, Dec. 1897 (Herb. Brit. Mus.).

Caulis 5·0–6·0 cm. altus, rigidus, rufo-villosulis. Internodia pauca inferiora usque 0·5 cm. long., pleraque vero breviora. Folia modice 6·0–8·0 cm. long., medio 0·35–0·5 cm. lat., puberula, marginibus albo-villosulis mox ciliolatis. Bracteæ vix 0·1 cm. lat., sursum attenuatæ, villosulæ. Calycis lobi usque ad 0·15 cm. coaliti, 1·0 cm. long., acuminati, villosuli. Corolla tota 2·0 cm. long., ejus

tubus villosulo-puberulus, juxta basin 0·1 cm. et medio 0·5 cm. diam., sub limbo usque 0·45 cm. attenuata; limbi circa 1·3 cm. diam. lobi late obovati, 0·7 cm. long. et lat.. medio oculati. Staminum anticorum filamenta vix 0·5 cm. et antheræ 0·35 cm. long. Ovarium 0·2 cm. long., compressum, stylo 2·0 cm. long. coronatum. Capsula 0·5 cm. long., vix totidem lat. Semina atra, subcylindrica, minutissime rugulosa.

A species with the habit of *A. pumilum* Bth. and the flowers of *A. elongatum* Engl. I have seen specimens of almost all the species of this genus, of which a considerable number have been described of recent years by German authors; and, after comparing with the present plant the descriptions of those not represented in this country, have failed in finding one which will fit the former. Dr. Rand informs me that this is a common plant at Buluwayo.

Rhigozum linifolium, sp. nov. Ramis sparsim foliosis tetragonis striatis spinas rectas validas hac atque illac ferentibus, ramulis foliiferis pulvinatim congestis ex axillis spinorum oriundis fulvo-tomentosis, foliis pro genere comparate elongatis congestis integris sessilibus vel brevissime petiolatis linearibus obtusis minute stellato-pubescentibus, pedunculis quam calyx brevioribus, calycis ampli stellato-pubescentis dentibus rotundatis, corollæ tubi parte contracta calycem subæquante parte superiori maxime ampliata, staminibus 5 quarum 2 altius insertis, ovario sessili compresso, fructu ?

Hab. Damaraland; *T. G. Fen*, 1879 (Herb. Brit. Mus.).

Rami glabri, 0·2 cm. diam.; internodia 1·5–2·5 cm. long. Spinarum paria inæqualia vel subæqualia, 0·5–0·8 cm. long., basi ipsa amplificata, mox glabra, eximie striata. Ramuli foliiferi 0·2 cm. long., circa 6-foliati. Folia 1·0–1·5 cm. long., 0·1–0·2 cm. lat., deorsum leviter attenuata, membranacea. Pedunculi 0·2–0·3 cm. long., pubescentes. Calyx totus 0·5–0·8 cm. long. et totidem lat.; ejus lobi 0·1 cm. long., 0·25 cm. lat. Corolla tota 2·0 cm. long.; tubus extus puberulus, deorsum 0·4 cm. lat., ad 0·5 cm. supra basin subito usque 1·4 cm. dilatatus; limbus paullo ultra 2·5 cm. diam. attingens. Filamenta 0·5 cm. long., complanata; antheræ oblongæ, 0·35 cm. long. Ovarium ambitu oblongum, sursum gradatim et leviter attenuatum, 0·3 cm. long. Stylus complanatus, sub apice parum clavatus, 2·0 cm. long.; stigmatis lobi ovati, 0·1 cm. long.

This is a noteworthy addition to a small South African genus. The lateral branches transformed into spines, together with the linear leaves and broad calyx, are points by which it can easily be recognized.

Trichosporum (§ Haplotrichium) **Forbesii**, sp. nov. Epiphyticum, caule sat tenui elongato radicante sparsim ramoso, foliis mediocribus ovatis vel lanceolato-ovatis raro lanceolatis acuminatis, pedicellis binis raro solitariis foliis multo brevioribus tenuibus tomentellis, corolla 4·0 cm. long. a basi gradatim amplificata coccinea.

Hab. Sogeri Region, New Guinea; *H. O. Forbes*, Nos. 43, 218*a*, 880 (Herb. Brit. Mus.).

Caulis pilis sparsis patulis plus minus obtectus, deinde glaber. Rami angulati vei subteretes, pallide straminei, 0·2–0·4 cm. diam.; internodia 5·0–10·0 cm. long. ramulorum juvenilium vero breviora. Folia 6·0–10·0 cm. long., 1·2–4·0 cm. lat., basi cuneata, coriacea, obscure nervosa, evanide puberula; petioli 0·5–1·0 cm. long., incrassati. Pedicelli 0·5-1·3 cm. long. Bracteæ bracteolæque lineares, 0·2 cm. long., in exemplariis scrutatis nonnunquam obsoletæ siquidem haud dilapsæ. Calycis pubescentis segmenta 0·5 cm. long., linearia. Corolla juxta basin vix 0·2 cm. lat., sub limbo fere 1·5 cm. attingens, deorsum glanduloso-pubescens sursum glabrior; lobi erecti, glanduloso ciliolati, anteriores late ovati, 1·3 cm. long., posteriores late oblongi. Filamenta breviter exserta, pilosula; antheræ ovatæ, 0·1 cm. long. Stylus vix exsertus, glanduloso-puberulus. Capsula ?

A species allied to *T. longiflorum* O. Kuntze (*Æschynanthus longiflora* DC.), but differing from it in the smaller leaves, short calyx, shorter and relatively broader corolla with broad lower-lip lobes which are markedly larger than those of the upper lip, and smaller anthers.

Trichosporum (§ Haplotrichium) **breviflorum**, sp. nov. Glabra, foliis lanceolato-ovatis caudato-acuminatis, floribus sparsis parvis brevipedunculatis, calycis glabri alte 5-partiti segmentis 0·5 cm. long. linearibus, corollæ extus glabræ tubo vix 1·0 cm. long. a basi gradatim et pro longitudine insigniter ampliato, ore parum obliquo, staminibus vix exsertis.

Hab. Negros Island; *John Whitehead* (Herb. Brit. Mus.).

Ramuli subpatentes, elongati, attenuati. Folia carnosa, modica 4·0–4·5 cm. long., juxta medium 1·0–1·5 cm. lat., basi acuta, petiolis glabris 0·2–0·4 cm. long. fulta. Pedunculi 0·2–0·45 cm. et pedicelli usque 0·4 cm. long. Corollæ verisimiliter coccineæ vel purpureo coccineæ tubus ima basi 0·2 cm., medio 0·5 cm., sub limbo 0·7 cm. diam.; limbi lobi anteriores ovato-rotundati, obtusissimi, anteriores ægre 0·6 cm. long., posteriores quam anteriores altius connati.

This seems to come nearest *T. philippinense* O. Kuntze (*Æ. philippinensis* Clarke), with which, except for the flowers, it is remarkably homoplastic. The flowers are, however, quite different. The small calyx and the very short and relatively broad corolla are points by which the new species can at once be told, not only from *T. philippinense*, but, indeed, from all its known congeners native to the Indian Archipelago.

Trichosporum (§ Haplotrichium) **nummularium**, Burkill & S. Moore, sp. nov. Repens, radicans, foliis miniatis subsessilibus late ovato-cordatis obtusis subtus minute tomentosis, pedunculis nunc sparsis nunc approximatis abbreviatis 1–2- rarissime 3-floris fulvo-tomentellis, calycis alte partiti segmentis oblongo-linearibus, corolla 3·0 cm. long. deorsum plus minus fulvo-tomentella sursum glabriore coccinea vel purpurea.

Hab. Sogeri Region, New Guinea, 2000–2500 ft.; *H. O. Forbes*, Nos. 114, 181, 511, 301 (Herb. Brit. Mus.). Between the south coast and the Owen Stanley range, 4000–5000 ft.; *Burke* (Herb. Kew.).

Caulis crebro ramosus fulvo-tomentosus deinde glaber; ramuli nonnunquam elongati; internodia 0·8–1·5 cm. long. Folia modica 1·0–1·3 cm. long. (pauca vero 1·8 cm. attingunt), 0·9–1·2 cm. raro usque 1·5 cm. lat., carnosa, obscure nervosa; petioli 0·1–0·2 cm. long., tomentelli. Pedicelli attenuati, 1·0–1·2 cm. long., tomentelli. Bracteæ et bracteolæ obsoletæ. Calycis segmenta 0·25 cm. long., 0·07 cm. lat., obtusa, puberula. Corolla infundibularis, deorsum fere usque ad 0·12 cm. diam. attenuata, ima basi subito dilatata ibique 0·22 cm. diam. attingens, sursum gradatim usque ad 0·6–0·8 cm. amplificata; os parum obliquum; lobi erecti, anteriores 0·35 cm. long. et 0·4 cm. lat., labium posticum 0·5 cm. long. Stamina breviter exserta; filamenta pilosula; antheræ oblongæ, 0·13 cm. long. Stylus abbreviatus, inclusus, fere omnino glaber. Capsula non suppetebant.

A very distinct species, apparently coming nearest *T. podocarpum* O. Kuntze (*Æ. podocarpa* Clarke), a plant known to me only by the description in Mr. Clarke's excellent monograph. The peculiar leaves, the relatively long pedicels, the small calyx, and curiously shaped corolla, together with the oblong anthers and short included style (though the latter character may, of course, not be constant), are features whereby it may be easily distinguished.

Mr. H. O. Forbes's rich collection, made in the Indian Archipelago, contains further examples of this genus, namely—

T. longiflorum O. Kuntze (*Æ. longiflora* DC.).
South-east Java. **No. 1043*b*.**
Has all the characters of *T. longiflorum*, as distinguished from those of *T. speciosum*, except that the calyx is short like the latter's.

T. Teysmannianum O. Kuntze (*Æ. Teysmanniana* Miq.).
South-east Java. Nos. 817, 1000, 1010, 1043*c*.
A fine series of specimens of this exceedingly rare species. The only authentic specimens of this seen by me are two small garden scraps in the Kew Herbarium. As might be supposed, the leaves of some of Mr. Forbes's specimens diverge somewhat from the typical form; others are typical except for possessing fewer hairs. The flowers of all agree closely with those of the Kew specimens.

T. Zollingerii O. Kuntze (*Æ. Zollingerii* Clarke).
South-east Java. **No. 1009.**
The species was founded on a specimen in the British Museum collected by Zollinger. Mr. Forbes's has a somewhat longer corolla (4·5 cm. long), with the tube broader under the limb, and the limb itself somewhat larger; in other respects it agrees with the type.

T. geminatum O. Kuntze (*Æ. geminata* Zoll.).
South-east Java. **No. 1011.**
I have adopted D. Don's earlier name for this genus. Much as one regrets disturbing established nomenclature, there seems no possibility of ignoring Don's work.

Dichotrichum papuanum (*Chalmersia papuana* F. Muell.). A fine specimen at the Museum gathered by Mr. Forbes in the Sogeri

Region of New Guinea (No. 776) agrees precisely with Baron Mueller's type at Kew.

Chirita (§ Eu-Chirita) **Forbesii**, sp. nov. Foliis ellipticis breviter acuminatis supra scaberrimis subtus hirsutis, pedunculis fasciculatis, involucri phyllis late ovatis 0·5 cm. long., pedicellis solitariis vel binis 0·5–2·0 cm. long., calycis 1·0 cm. long. dentibus 0·3 cm. long. triangulari-deltoideis.

Hab. Sumatra; *H. O. Forbes*, No. 1830 (Herb. Brit. Mus.).

Planta verisimiliter erecta facie *C. Blumei* Clarke. Caulis pilis strigosis articulatis albis onustus, in longitudinem sulcatus. Folia opposita, consimilia, inæqualia. majora 16·0 × 9·0 cm., minora 7·0–8·0 × 3·5 × 4·5 cm., basi rotundata, coriacea, crenulata; costæ secundariæ utrinque 12–17, raro pauciores; petioli 1·0–5·0 cm. long. Pedunculi plerique 2–4-ni, 3·0–4·0 cm. long., puberuli, mox fere glabri. Bracteæ more sectionis omnino liberæ, extus puberulæ. Pedicelli fere glabri. Calycis fere glabri dentes 5, acutæ. Corolla 3·0 cm. long., infundibularis, extus fere omnino glabra. Staminum fertilium filamenta vix 1·2 cm. long., deorsum complanata, sursum teretia; antheræ fulvo-barbatæ, 0·12 cm. long.; staminodia 0·5 cm. long., apice villosa. Ovarium cum stylo 1·5 cm. long., minutissime fulvo-pubescens. Capsula nondum matura 7·5–8·0 cm. long., 0·15 cm. diam., subteres.

A plant treacherously like *C. Blumei* Clarke, but the free bracts must keep it out of § *Liebigia*. The corollas are somewhat different from those of *C. Blumei*, being a little shorter and narrower in the tube; the anthers are smaller and bearded on the connective; the ovary is slender and not flattened, and the subterete capsule is quite different from the broad capsule of the other species. Some of the Museum specimens referred to *C. Blumei*, however, and notably Zollinger's (No. 911), have slender capsules, and this creates the suspicion that two distinct species may have been given this name.

MERIONETHSHIRE MOSSES.

By J. E. Bagnall, A.L.S.

In July, 1898, I spent a week with Alderman Holden at his bungalow on the banks of the Afon Prysor, a mountain stream rising in Llyn Conlog, about four miles and a half north-west of the Arenig; and as my host was as keen a lover of mosses as myself, most of our time was spent in collecting and studying those growing within a mile radius of the bungalow.

The valley of the Afon Prysor is narrow, surrounded by mountains, and near the source of the river is crossed by the beautiful viaduct of the Bala and Festiniog railway. In its upper reaches both the valley and the river bed are filled with boulders of every shape and size, many of them being quite colossal; these are clothed with Andreæas, Grimmias, and other rock-loving species, and yielded us many charming and interesting species. The rocks of the valley

are similar to those of the Arenig, the Lower Ordivician, I believe, greyish igneous rocks, with here and again sparkling white masses of auriferous quartzite. The subsoil is a cold, compact, impervious boulder clay, apparently perfectly free from any trace of calcareous matter; nor did we find any evidence of lime in the district, the river-water being as soft as rain-water, hence probably the absence of many of the limestone-loving species. The mountain sides, which are thinly clothed with grass, are to a great extent unproductive marsh and bog. The flora seems scanty, and scarcely alpine in character, belonging mostly to what Mr. Hewett C. Watson termed the "British Type," and, with one or two exceptions, all of them plants we find on our Staffordshire moorlands. The more noticeable are *Nymphæa lutea*,* *Castalia speciosa*,† *Drosera rotundifolia*, *Viola palustris*, *V. lutea*, *Sedum anglicum*, *Wahlenbergia hederacea*,* *Vaccinium Vitis-Idæa*,† *V. Myrtillus*, *Myosotis repens*, *Menyanthes trifoliata*,* *Pinguicula vulgaris*, *Empetrum nigrum*,† *Habernaria chloroleuca*, a few specimens; *Narthecium ossifragum*, *Scirpus cæspitosus*, *Eriophorum vaginatum*, *E. angustifolium*, *Carex curta*,* *C. binervis*, *C. acutiformis*,* *Nardus*, *Molinia varia*, *Festuca vivipara*, and allies; *Lomaria spicant*, *Asplenium Trichomanes*, *A. Adiantum-nigrum*, *Athyrium Filix-fœmina*, *A. erectum*, *Lastræa Oreopteris*,* *L. paleacea*, *Phegopteris polypodioides*, *Lycopodium Selago*, *L. clavatum*,† *L. alpinum*,† and at from 1000 to 1200 ft. above sea-level, *Rubus idæus*, *R. obtusifolius*,* *R. Selmeri*, *R. leucostachys*, *R. pallidus* Bab., *Rosa tomentosa* and *R. dumalis* were growing, vigorous and full of promise for fruit. But the mosses were abundant, *Sphagnum* growing by the acre, rich in variety and with great masses fruiting freely. The season was a dry one, or many of the places we visited would have been impassable. The following are the localities we collected from, with their height above sea-level, and to save space I have numbered each of these, quoting these numbers after each species collected there.

1. Llyn Tryweryn; 1267 ft. This is near the Arenig, two miles south-east of the Afon Prysor, and its waters flow into an affluent of the Dee.
2. Llyn Conlog-mawr; 1377 ft.
3. Llyn Conlog-bach; 1380 ft.
4. Llyn-du-bach; 1440 ft.
5. Llyn-y-garn; 1449 ft.
6. Llyn-corsy-bocud; 1500 ft.
7. Afon Prysor; 1000 to 1200 ft.
8. Corsant-y-Gasey; 1000 to 1600 ft.; a beautiful waterfall by Moel-y-Slates.
9. Moel-y-Slates; 1871 ft.

All these form part of the watershed of the Afon Prysor, whose waters fall into Cardigan Bay.

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* The plants above named marked thus * are not recorded in *Topographical Botany* for Merionethshire; those plants marked † are given without an authority attached.

Sphagnum cymbifolium Ehrh.; 1, 6, 9.—*γ congestum* Schp.; 4. —*S. papillosum* Ldb.; 1, 3, 6, 9.—*β confertum* Ldb.; 1, 7, 9.—*γ stenophyllum* Ldb.; 7, 9.—*S. rigidum* Schp.; 1, 2, 3, 6, 7, 9.—*β compactum* Schp.; 9.—*S. molle β Mulleri* Braith.; 7.—*γ tenerum* Braith.; 4, 9.—*S. tenellum* Ehrh.; 1, 4, 9.—*S. subsecundum* Nees; 4, 6, 9.—*β contortum* Schp.; 4, 6, 9.—*δ obesum* Schp.; 7, 9.—*ε viride* Boul.; 9.—*S. teres* Angstr.; 9.—*S. acutifolium* Ehrh.; 1, 4, 8.—*β rubellum* Russ.; 1, 7, 9.—*γ tenellum* Schp.; 4.—*ε elegans* Braith.; 1, 3, 9.—*ζ purpureum* Schp.; 1, 4, 3.—*ι fuscum* Schp.; 4, 9.—*κ arctum* Braith.; 9.—*λ luridum* Hüb.; 9.—*μ patulum* Schp.; 9.—*υ læte-virens* Braith.; 1, 4.—*S. fimbriatum* Wils.; 1, 4, 7.—*S. intermedium* Hoffm.; 1, 7, 9.—*S. cuspidatum* Ehrh.; 4.—*γ plumosum* N. & H.; 4.

Andreæa petrophila Ehrh.; 1, 7.—*A. rothii* W. & M.; 7, 9.—*γ hamata* Lind.; 7.—*δ falcata* Lind.; 7, 9.

Tetraphis pellucida Hedw.; 7.

Catharinea undulata W. & M.; generally distributed.—*C. crispa* James; 1, 7.

Oligotrichum incurvum Ldb.; 1, 4, 7, 8, 9.

Polytrichum aloides Hedw.; 7.—*P. urnigerum* L.; 7.—*P. alpinum* L.; 4, 7.—*P. piliferum* Schreb.; generally distributed.—*P. juniperinum* Willd.; 4, 9.—*P. strictum* Banks; 3, 4, 9.—*P. formosum* Hedw.; 1, 4, 7, 9.—*P. commune* L.; generally distributed.—*β perigoniale* B. & S.; 9.—*γ minus* Weis.; 7.

Diphyscium foliosum Mohr; 1, 2, 7.

Pleuridium axillare Ldb.; 7.—*P. subulatum* Rab.; 7.

Ditrichum homomallum Hpe.; 1, 4, 7, 9.

Ceratodon purpureus Brid.; general.

Rhabdoweissia fugax B. & S.; 7, 9.—*R. denticulata* B. & S.; 7. 8.

Dichodontium pellucidum Schp.; 3, 4, 5, 6, 9.—*D. flavescens* Ldb.; 7.

Dicranella heteromalla Schp.; general.—*δ sericea* Schp.; 7.—*D. cerviculata* Schp.; 7.—*D. rufescens* Schp.; 7.—*D. varia* Schp.; 7.—*D. Schreberi β elata* Schp.; 8.—*D. squarrosa* Schp.; 4, 7, 9.

Blindia acuta B. & S.; 4, 8, 9.

Dicranoweissia cirrata Ldb.; 7.

Campylopus flexuosus Brid.; 4, 7, 9.—*γ paradoxus* Husn.; 9.—*C. pyriformis* Brid.; 7, 9.—*C. fragilis* B. & S.; 6, 8, 9.—*C. atrovirens* De Not.; general.

Dicranum Bonjeani De Not.; 7, 8.—forma *rugifolium* Bosw.; 7.—*D. scoparium* Hedw.; general.—*γ orthophyllum* Brid.; 4.—*D. majus* Turn.; 7, 9.

Leucobryum glaucum Schp.; 1, 7, 8, 9.

Fissidens exilis Hedw.; 4.—*F. incurvus* Starke; 7.—*F. tamarindifolius* Wils.; 7.—*F. bryoides* Hedw.; 7.—*F. osmundoides* Hedw.; 4, 7.—*F. adiantoides* Hedw. 5, 7.—*F. decipiens* De Not.; 7.—*F. taxifolius* Hedw.; 7.

Grimmia apocarpa Hedw.; general.—*β rivularis* W. & M.; 7.—*γ gracilis* W. & M.; 7.—*G. pulvinata* Sm.; general.—*G. trichophylla*

Grev.; 5, 7.—*G. decipiens* Lindb.; 4.—*G. patens* B. & S.; 3, 9.—*G. Doniana* Sm.; 5, 7.—*G. ovata* Schwgr.; 5, 9.

Rhacomitrium ellipticum B. & S.; 4, 9.—*R. aciculare* Brid.; 1, 2, 3, 4.—*β denticulatum* Wils.; 1, 4, 5, 7, 9.—*R. protensum* Braun.; 1, 4, 5, 7, 9.—*R. fasciculare* Brid.; 4, 7, 8, 9.—*R. heterostichum* Brid.; 1, 3, 7, 9.—*β alopecurum* Hüb.; 3, 7.—*obtusum* Lindb.; 7, 9.—*γ gracilescens* B & S.; 7, 9.—*R. sudeticum* B. & S.; 4.—*R. lanuginosum* Brid.; general.—*R. canescens* Brid. 3, 7.—*β ericoides* B. & S.; 7.

Ptychomitrium polyphyllum Fürn.; general.

Hedwigia ciliata Ehrh.; 7.

Phascum cuspidatum Schreb.; 7.

Pottia truncatula Ldb.; 7.

Tortula muralis Hedw.; general.—*β rupestris* Wils.; 7.

Barbula rubella Mitt.; general. — *β dentata* Mitt.; 8. — *B. tophacea* Mitt.; 7.—*B. fallax* Hedw.; 1, 7.—*B. rigidula* Mitt.; 7. — *B. spadicea* Mitt.; 3, 7. — *B. cylindrica* Schp.; 1, 8. — *B. vinealis* Brid.; 4, 8.—*B. revoluta* Brid.; 7.—*B. convoluta* Hedw.; general.—*B. unguiculata* Hedw.; general.—*β cuspidata* Braith.; 7.

Weissia viridula Hedw.; 7.—*W. tenuis* C.M.; 4.—*W. rupestris* C.M.; 2, 3, 4, 7, 8.—*W. curvirostris* C.M.; 8.

Trichostomum crispulum Bruch; 1, 3, 4, 7. — *T. tenuirostre* Ldb.; 4.—*T. tortuosum* Dixon; 5, 7.

Cinclidotus fontinaloides P.B.; 4.

Encalypta streptocarpa Hedw.; 7.

Zygodon Mougeotii B. & S.; 7, 8.

Ulota Bruchii Hornsch.; 7.—*U. crispa* Brid.; 7.—*β intermedia* Dixon; 7.

Orthotrichum rupestre Scleich; 7. — *O. leiocarpum* B. & S.; 7. —*O. affine* Schrad.; 1, 7.—*stramineum* Hornsch.; 7.

Splachnum sphæricum L.; 2, 3, 4, 7.

Physcomitrium pyriforme Brid.; 7.

Funaria fascicularis Schp.; 7.—*F. ericetorum* Dixon; 7.—*F. Templetoni* Sm.; 7, 8.—*F. hygrometrica* Sibth.; 7, 8.

Aulacomnium palustre Schwgr.; general. — *A. androgynum* Schwgr.; 4.

Bartramia pomiformis Hedw.; 5, 7, 9.

Philonotis fontana Brid.; general.—*P. cæspitosa* Wils.; 1, 9.—*P. calcarea* Schp.; 1.

Breutelia arcuata Schp.; general.

Webera polymorpha Schp.; 7.—*W. acuminata* Schp.; 7.—*W. elongata* Schp.; 5, 7.—*W. nutans* Hedw.; general. — *β longiseta* B. & S.; 7.—*W. albicans* Schp.; 4, 7.—*W. carnea* Schp.; 7.—*W. annotina* Schwgr.; 9.

Plagiobryum Zierii Lindb.; 4.

Bryum filiforme Dicks; 7, 8. — *B. lacustre* Brid.; 7.—*B. inclinatum* Bland.; 7, 9.—*B. pallens* Sw.; 4, 7, 9.—*B. bimum* Schreb.; 3, 7, 9.—*B. pseudo-triquetrum* Schwg.; 4, 7, 9.—*B. cæspiticium* L.; general.—*B. capillare* L.; general.—*β flaccidum* B. & S.; 7.—*B. alpinum* Huds.; 1, 7.—*B. argenteum* L.; 7.

Mnium undulatum L.; general.—*M. hornum* L.; general.—*M. serratum* Schrad.; 1.—*M. punctatum* L.; 7, 8.

Fontinalis antipyretica L.; 1, 7, 8.

Neckera crispa Hedw.; 5.

Homalia trichomanoides Brid.; 7.

Pterygophyllum lucens Brid.; 7.

Pterogonium gracile Sw.; 5.

Porotrichum alopecurum Mitt.; 7.

Heterocladium heteropterum B. & S.; 7, 8, 9.

Thuidium tamariscinum B. & S.; general.—*T. recognitum* Ldb.; 3, 7.

Climacium dendroides W. & M.; 3, 7, 9.

Isothecium myurum Brid.; 4, 7.

Pleuropus sericeus Dixon; 7.

Brachythecium albicans B. & S.; 7.—*B. rutabulum* B. &. S.; 6, 7.—*B. velutinum* B. & S.; general.—*B. populeum* B. & S.; 7.—*B. plumosum* B. & S.; 7.—*β homomallum* Schp.; 9. *B. purum* Dixon; 7..

Hyocomium flagellare B. & S.; 1, 4, 7, 9.

Eurhynchium prælongum B. & S.; 7.—*β Stokesii* L. Cat. Ed. ii.; 7.—*E. myosuroides* Schp.; general.—*E. striatum* B. & S. 7.—*E. ruscifo rme* Br. & Schp.; general.—*E. murale* Milde; 7.—*E. confertum* Milde: 7.

Plagiothecium Borrerianum Spr.; 7.—*P. denticulatum* B. & S.; 7.—*γ majus* Boul.; 7.—*P. sylvaticum* B. & S.; 5, 8.—*P. undulatum* B. & S.; 4, 7, 8, 9.

Amblystegium serpens B. & S.; general.—*A. varium* Lab.; 7.—*A. filicinum* De Not.; 1, 3, 7, 8, 9.

Hypnum riparium L.; 7.—*H. stellatum* Schreb.; 5, 7, 9.—*H. aduncum* Hedw.; 1, 7, 9.—*H. fluitans* L.; 1, 7, 9.—*H. exannulatum* Gümb.; 7.—*H. uncinatum* Hedw.; 7.—*H. revolvens* Sw.; 7.—*H. intermedium* Ldb.; 1, 4.—*H. commutatum* Hedw.; 7.—*H. falcatum* Brid.; 7, 9.—*H. cupressiforme* L.; 7.—*γ filiforme* Brid.; 7.—*δ minus* Wils.; 9.—*ζ ericetorum* B. & S.; 7.—*η tectorum* Brid.; 7.—*H. molluscum* Hedw.; 7.—*H. palustre* L.; 4, 7.—*γ subsphæricarpon* B. & S.; 3, 8.—*H. eugyrium* Schp.; 7.—*H. ochraceum* Turn.; 7.—*β flaccidum* Milde; 7.—*H. scorpioides* L.; 1, 4, 7, 9.—*H. stramineum* Dicks.; 1, 7, 9.—*H. sarmentosum* Wahl.; 2, 7, 9.—*H. cuspidatum* L.; general.—*H. Schreberi* Willd.; 4, 7, 9.—*H. splendens* B. & S.; general.—*H. loreum* B. & S.; 7.—*H. squarrosum* B. & S.; general.—*β calvescens* Hobk.; 7.—*H. triquetrum* B. & S.; 8.

SHORT NOTES.

De Chromotaxia in usum Botanicorum et Zoologorum.—Cum esset jam compertum quam vage non raro et incerte nomina colorum, præcipue latina, naturalistæ interpretentur et quo scientiæ damno, anno 1891 non sine longo examine et studio opellam digerere conatus sum, *praxi* tantum dicatam, quæ auxilio speciminum coloratorum stabilitatem et claritudinem quandam in hoc gravi negotio afferret. Præfationem opellæ his verbis concludebam: "naturalistæ si in hoc *Chromotaxiæ* tentamine mendas inveniant, velint benigne corrigere; approbatum vero jugiter sequantur, ut ubique nomenclatura colorum unica et certa habeatur." Revera cum plurimi naturalistæ, tam ex Europa quam ex America et Australia, conatum meum non solum approbavissent sed etiam in scriptis suis adhibuissent, exhausta jam prima opellæ editione, anno 1894 alteram edidi in essentialibus cum prima identicam; quo factum est ut et, quoad colores, naturalistarum nomenclatura magis uniformis et certior de die in diem facta sit. Rebus sic stantibus, non sine stupore in hujus Diarii n. 435 perlegi dissertationem eruditissimi B. D. Jackson, titulo: *A Review of the Latin Terms used in Botany to denote Colour*. Cl. auctor, qui certe difficultates Botanices descriptivæ nunquam expertus est, cum validitatem *Chromotaxiæ* objectionibus sane futilibus infirmet, cum dubia prisca renovet et potissimum cum exhibeat Conspectum colorum multo magis vagum et incertum et nullis speciminibus coloratis declaratum, in confusionem pristinam nos jactat. Ubi scientiæ utiles esse velimus oportet, si aliquid castigemus, opera nostra sit aptior et utilior.* Non negarem *Chromotaxiam* meam, maxime quoad *colores affines*, leviter claudicare (nam quid certi scimus de iis ex auctoribus antiquis et ex lexicis?), at cum sit soli *usui* dicata, cum sit jam fere a novennio a compluribus accepta et adhibita, cum postremo sit speciminibus coloratis constantibus exacte præfinitam, Botanicos et Zoologos enixe rogo velint eâ uti pergere.—P. A. Saccardo.

Lamium album β integrifolium Nolte (p. 131).—Mr. Arthur Bennett, whose sharp eye nothing escapes, sends me the following references to this plant:—

"*L. album* β *integrifolium* Nolte, foliis integerrimis vel subdenticulatis." Sonder, Fl. Hamburg., 328 (1851).

"*L. album* β *integrifolium* Nolt. (Hans. Herb. 1028). *L. parietariæfolium* Benth. Bladene heelrandede, ægformede, de övre smalere." Lange, Handb. Danske Flora, ed. 3, 440 (1864).

"*L. album* (L.) f. *parietariæfolium* (Bentham) (*integrifolium* Nolte in Hansen Hb. 1028 ohne Beschreibung und Fundort): Blatter ganz randig; *molle* Nolte bei Reichbach fil. S. 26. Deezbüll in der Tonderner Marsch (Jörgensen) (Henniges 29!); Flensburg: bei Jürgensens Villa (Grünwald 71)!"—Prahl, Krit. Flora Prov. Schleswig-Holstein, ii. 169 (1890).—James Britten.

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* Laudandus cl. Jackson ob Bibliographiam operum de coloribus tractantium, sed multo magis esset laudandus si multa nomina nova colorum, quæ ex libris variis hausit, *Chromotaxiæ* numeris inseruisset, potius quam—confusionem augens!—in suis novis sectionibus.

PSAMMA BALTICA. — Since writing the note on p. 135, I see that the Rev. K. Trimmer, in his Norfolk Flora, gives "Titchwell" as a locality for *Psamma arenaria* and for *Calamagrostis Epigejos*. Titchwell has salt-marshes, brackish ditches, and a sandy shore, so that, though probably not in juxtaposition, the two plants would be not very distant from each other. I can find no other record of the two species in Britain growing so close together.—ARTHUR BENNETT.

N. HANTS PLANTS.—On June 17th, 1898, I found the following near Fleet Pond:—*Rubus Koehleri* W. & N. var. *cognatus* (N. E. Brown). By the road on the N. side.—*Orchis incarnata* L. A form with pure white flowers abounds in a swamp at the S.W. end, the rosy-flowered plant being much scarcer.—*Eriophorum angustifolium* Roth, var. *longifolium* Hoppe. Plentiful about a mile to the S.W. —*Carex Hornschuchiana* × *Oederi*. Near the S. shore, sparingly; I am not sure whether type-*Oederi* or var. *oedocarpa* Anderss. (*flava*, *minor* of Townsend) was the second parent, as both grew at the spot. —EDWARD S. MARSHALL.

BIBLIOGRAPHICAL NOTES.

XVIII.—FRANCIS BAUER'S 'DELINEATIONS OF EXOTICK PLANTS.'

THIS is not a very important work from a botanical point of view, but as we have in the Department of Botany a copy containing its history, it may be worth while to place this on record. The copy in question belonged to Sir Everard Home, and was purchased for the Department in 1886.

The title-page of the book, which was issued with the first number, runs:

"Delineations of Exotick Plants cultivated in the Royal Garden at Kew. Drawn and coloured, and the botanical characters displayed according to the Linnean System, by Francis Bauer, Botanick Painter to His Majesty. Published by W. T. Aiton, His Majesty's Gardener at Kew. London: Printed by W. Bulmer & Co. for George Nicol, Bookseller to His Majesty, Pall-Mall. 1796."

This is given in Pritzel, no. 494, with the date "1791–1800" and "Ericaceæ" added, but the latter indication does not seem to have suggested to Pritzel the identity of the book with his no. 498, "Triginta tabulæ Ericarum ineditæ, a Mackenzie sculptæ. Londini 1790–1800. folio. Bibl. Regia Berol." The two are of course identical.

These plates represent three numbers (of ten each) of what was evidently intended from the preface to have been a much more extensive work. The following account of its production is given by Sir Everard Home on the blank page before title:—

"Of the first number there were 90 copies & 10 were spoil'd in colouring & hot press'g.. Of the second there were 80 and all were distributed. Of the third there were only 50, and four of the plates are lost.

"Mackenzie had 4 guineas for engraving each plate, when he died Bazier [Basire] did the rest which he could not refuse Sir Joseph, he said, as he engraved for the R[l]. Soc. for 8 guineas, and one was engrav'd by Mr. Ferdinand Bauer.

"The dedication and preface is by Sir Joseph Banks.

"From the information given to me by Mr. Fr. Bauer.

"E. HOME."

To this is added in pencil in what may be the same hand:—"The drawings are with Sir Joseph's other drawings in the British Museum."

Mackenzie was one of the engravers employed by Banks in preparing the large series of plates of plants collected during Cook's First Voyage. Impressions of twenty-eight of these, according to Pritzel, who describes them as "tabulæ æri insculptæ inter omnes summi artificis facile pulcherrimæ," are in the Berlin Library. The proofs in the Department of Botany are signed "D. M[c]Kenzie" or "D. Mackenzie" indifferently. I can find no information about him: I am told that his name and works are alike unknown in the Print Room of the British Museum, and he does not appear in any dictionary of artists. After his name on plate 23 (dated 1800) someone—I think Home—has added in pencil the words "and died." He engraved twenty-seven of the plates of *Erica*; only two (nos. 24 and 27) were engraved by James Basire, whom I take to be the second of that name in the well-known family of engravers; and one, as has been said, was engraved by Ferdinand Bauer (no. 29).

The following is a list of the thirty species of *Erica* figured, with the year of publication appended as engraved on each (in every case preceded by "Jan. 1)" and certain marks prefixed. The * indicates that Bauer's original finished drawing for the plate is in the Department of Botany; the ‡ indicates that his sketch or certain details, but not the completed drawing, will be found there. The † is prefixed to those of the drawings for the work which, Mr. Hemsley informs me, are in the library of the Kew Herbarium. It will be seen that drawings for some of the plates are both at the Museum and Kew, and that one or two are at neither.

ERICA.

Part I.		Part II.		Part III.	
*1. viscaria	1793	*11. sexfaria	1793	†21. corifolia	1800
*2. halicacaba....	,,	†12. conspicua ..	,,	‡22. baccans	1793
*3. obliqua	,,	*13. cruenta	,,	*†23. ramentacea..	1800
*4. longifolia	,,	*†14. marifolia....	,,	††24. Leeana.....	1802
*5. umbellata	,,	*†15. mucosa	,,	†25. coccinea	1800
*6. fascicularis ..	,,	16. urceolaris ..	,,	†26. vestita	,,
*7. Monsoniæ	,,	*†17. glutinosa....	,,	†27. pyramidalis..	,,
*8. grandiflora ..	,,	18. comosa.....	,,	†28. tubiflora	,,
*9. Plukenetiana..	,,	†19. taxifolia	,,	††‡29. Banksii	1801
*10. Sebana.....	,,	‡20. Massoni.. ..	,,	*30. cerinthoides .	1793

The dates of publication as given in this table cast some doubt as to the value of this information, which is usually, I think, taken as evidence of actual issue. It will be observed that nos. 1–20,

forming parts 1 and 2, are all dated Jan. 1, 1793; but the first number appeared in 1796, and the second in 1797.* The third part, which appeared in 1803, contains plates dated 1793, 1800, 1801, 1802—the last of the number bearing date 1793. Pritzel's dates for the work, "1792–1800," are thus both inaccurate, as is 1790, which is given under his other title for the book.

XIX. Samuel Curtis's 'Beauties of Flora.'

A NOTE may be made of another little-known work, of no botanical importance, which we have in the Botanical Department, where it is bound with Samuel Curtis's *Monograph of Camellia*. This is a series of ten folio plates, to which is prefixed an ornamental engraved title-page, running as follows:—

THE

BEAUTIES

OF

FLORA

BEING A SELECTION OF FLOWERS PAINTED FROM NATURE BY EMINENT ARTISTS,

WITH ACCURATE DESCRIPTIONS IN ENGLISH AND FRENCH, TOGETHER WITH THE MOST APPROVED METHOD OF CULTURE, BY

SAMUEL CURTIS, F.L.S.

FROM WHOSE COLLECTION THE SPECIMENS ARE SELECTED.

[Here an allegorical picture of Flora (?).]

PUBLISHED BY S. CURTIS, GAMSTON, NOTTS.

1820.

The work is not mentioned by Pritzel, though it is included in Mr. B. D. Jackson's *Guide*. There is no letterpress, and I think none was ever issued, notwithstanding the statement on the title-page which was no doubt issued with the first (? only) instalment. I find no reference to it in the scanty biographies of Samuel Curtis. It seems to be rare, as there is no copy in the British Museum Library, nor at Kew.

The ten plates (which are not numbered) represent groups of flowers, as follows:—

1. } Dahlias.
2. }
3. Anemones.
4. Auriculas.
5. Polyanthus.
6. Hyacinths.
7. Carnations.
8. Pinks.
9. Tulips.
10. Ranunculus.

None of them bear any title: the name of Weddell as engraver appears on Nos. 1, 2, and 6. On Nos. 9 and 10 is printed

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* See *Annals of Botany*, i. 16 (1805).

"Published by S. Curtis, Gamston, Notts, 1820" and on No. 9 is also printed "painted by T. Baxter," who evidently executed all but the first two, which are unmistakeably the work of Clara Maria Pope. So far as dates are concerned, this Baxter may be identical with the Worcester china-painter Thomas Baxter, of whom a short account is given in the Dict. Nat. Biogr. iii. 437, and who died in London, April 18, 1821. The flowers are beautifully drawn and coloured; each is backed by a conventional landscape, in the style of those similarly placed in Thornton's *Temple of Flora*.

That the work was never carried to completion seems clear from the absence of letterpress and the incomplete lettering of the plates. Mr. Hemsley directs my attention to an advertisement on the wrapper of the *Botanical Magazine* for August, 1831, which seems to show that only the above-named ten plates were issued, and that these were obtainable separately. After a reference to the *Monograph of Camellia*, the advertisement proceeds:—"Also some splendid Cabinet Pictures of the same size as the Work on Camellias, consisting of a Series of Ten highly-finished Groups of the most esteemed Flowers amongst Florists: viz. Tulips, Hyacinths, Ranunculuses, Anemonies, Carnations, Pinks, Polyanthuses, Auriculas, and Two of Dahlias. These splendid coloured engravings may be had separate at 12s. each; or the whole Series of Ten, for £5, with a very highly ornamental Title to the whole. The Series of these superb coloured Plates, in appropriate Frames, would grace any Drawing Room."

JAMES BRITTEN.

NOTICES OF BOOKS.

Flora of Cumberland, containing a full List of the Flowering Plants and Ferns to be found in the County, according to the latest and most reliable Authorities. By WILLIAM HODGSON, of Workington, A.L.S. With an Introductory Chapter on the Soils of Cumberland by J. G. GOODCHILD, H.M. Geological Survey. Carlisle: W. Meals & Co. 8vo, cloth, pp. xxxvi, 398. Price 7s. 6d.

MR. HODGSON has given us a nicely-printed and interesting volume, and one which will be of service to future workers. He has devoted many years to its compilation, and has himself thoroughly investigated the botany of the county, and has secured much local help. As far as the author's qualifications go, it is a conscientious and painstaking piece of work, and the Flora, more than any with which we are acquainted, is an individual undertaking. To this indeed it owes both its interest and its defects. Notwithstanding the reference in the titlepage to "the latest and most reliable authorities," we cannot find from the preface or from the book itself that any British botanist of note, with the important exception of Mr. J. G. Baker, has been consulted; the Rev. Hilderic Friend, whose help is specially acknowledged, can hardly be considered a critical, although he may be, as Mr. Hodgson says, "a

very competent," botanist; and the names of the other helpers are even less familiar.

As a consequence of this isolation, it is to be feared that in such genera as *Rubus*, *Rosa*, *Hieracium*, *Potamogeton*, *Carex*, and *Chara*, besides others which might be mentioned, Mr. Hodgson's book will be of small value to students, for we find no reference of any sort to those who are recognized as authorities upon these critical groups of plants. This does not imply, as has been said already, that Mr. Hodgson and his friends have not taken all reasonable pains in arriving at their conclusions, but it is certain that these conclusions require checking and comparison before they can be accepted as authoritative. In *Hieracium*, for example, the need of some such comparison is manifest, not only on account of the difficulty presented by the species themselves, but because the records of Backhouse and Baker, which represent at any rate one period in the history of our knowledge of Hawkweeds, are placed side by side with those of the author, Mr. Friend, and others, whose qualifications are not so well known.

The same want of critical method is noticeable in other ways. Undoubted aliens and errors, for instance, are placed on exactly the same footing, so far as typography is concerned, as genuine members of the flora. There is, we have always maintained, much to be said in favour of placing these in their proper sequence instead of relegating them to an appendix; but they should be differentiated by change of type, absence of number, use of brackets, or in some other way. The very first plant in the book, *Clematis Vitalba*, is noted as "Alien: an occasional straggler from cultivation"; and the localities given suggest that it hardly even "straggles from" gardens and houses. Then, in the same Order, we have *Adonis autumnalis*, "a weed in gardens where it has probably been an object of cultivation" and once seen in a flax crop; *Delphinium Ajacis* and *D. Consolida* (were both species accurately determined?); *Actæa spicata*, "in the grounds" of a mansion, "doubtfully native"; *Helleborus fœtidus*, "a specimen" in a collection, "probably an outcast"; *Ranunculus parviflorus*, "not regarded as indigenous, gathered with other casuals." Among the Batrachians we find *Ranunculus circinatus*, "given in Black's Guide as a plant of Ullswater," but doubted by Mr. Baker and not confirmed by Mr. Hodgson, and reported by others who "now regard their identification as open to doubt;" *R. Baudotii*, in one locality, on the authority of the Rev. R. Wood, an excellent man but hardly a critical botanist; we have also *Thalictrum saxatile*, of which Mr. Hodgson says "a solitary plant" gathered by him was identified by Mr. Watson as this species, but that he himself "failed to discover any striking difference between this and *T. minus*"—a local worker adds another locality. Even if we accept as accurate all the other Batrachian records (many of which seem doubtful) and allow that *Aconitum* is naturalized, it would seem that out of thirty-seven numbered species in *Ranunculaceæ*, ten at least must be regarded as having little or no claim to rank as integral portions of the Flora. An analysis of other parts of the book yields similar results.

So far as Mr. Hodgson's own observations are concerned—his references to local names and uses, and the incidental information by which he is enabled to throw light upon the introduction or disappearance of certain plants—the book is, as we have said, both useful and interesting. He has given us an excellent biographical introduction, which, like Mr. Goodchild's essay on the Soils of Cumberland, is of just the right length. The bibliographical references are less satisfactory; and the proofs might have been more carefully read. The printers have, for some reason, almost invariably used a small instead of a capital initial for generic names when occurring incidentally in the text; and there are puzzling abbreviations, such as "Web. ex–P." as the authority for *Ranunculus heterophyllus;* the oddest slip is perhaps "*Mentha requiem*," for *M. Requienii*. Mr. Hodgson's volume, which is arranged in accordance with the eighth edition of the *London Catalogue*, will find a place on the shelves of all those who collect British Floras; and although it will not take rank among the best examples of that class of literature, it goes some way towards supplying a gap in our list. Had the author, when dealing with certain groups of plants, consulted those authorities who are always willing to impart to others the knowledge they have themselves obtained at the expenditure of time, trouble, patience and perseverance, he would have produced a more satisfactory book.

JAMES BRITTEN.

SOME BOOKS ON GRASSES.

A Manual of the Grasses of New South Wales. By J. H. MAIDEN. 8vo, pp. 199, with 20 plates. Sydney: Gullick. 1898. Price 4s. 6d.

Synopsis der Mitteleuropäischen Flora. Von P. ASCHERSON & P. GRAEBNER. Lief. 6, 1898; Lief. 7, 1899. Leipzig: Engelmann. Price 2 m. each part.

Graminées. Descriptions, figures et usages des Graminées, spontanées et cultivées, de France, Belgique, Iles Britanniques, Suisse. Par T. HUSNOT. Livr. 3. Folio, pp. 49–72, tt. 18–24. Cahan: T. Husnot. 1898. Price 6s.

THE paper-covered book on New South Wales Grasses, by Mr. J. H. Maiden, Government Botanist and Director of the Botanic Gardens, Sydney, is a Government publication issued by authority of the Minister for Mines and Agriculture. It is primarily intended to help "the farmer and pastoralist," to assist them not only in identifying the various kinds of grasses, but also in appraising their value, and as a guide to their cultivation and improvement. With this view the author has inserted under each Grass, besides the botanical name, description and usual information, any agricultural notes which he has been able to glean from his own experience or the writings of practical agrostologists. Thus copious references occur to such works as Duthie's *Fodder Grasses of Northern India*, F. M. Bailey's *Monograph of Queensland Grasses*, Vasey's *Agricultural Grasses of the United States*, and others. In

the arrangement of genera and species and the botanical descriptions he copies Bentham's *Flora Australiensis*. Reference is made to previous figures of the species, though somewhat inadequately, as only the name of the author or publication is cited—thus "Trinius," "Agricultural Gazette," "Bailey." The "list of works consulted" (pp. 5–7) will supply the missing titles; but the number of volume, and page or plate, should also have been given. The twenty plates included in the volume give a fair idea of the habit of as many species and include also useful enlargements of spikelets and floral dissections. We regret that Mr. Maiden has thought it necessary to coin several so-called popular names. Surely *Agropyrum pectinatum* is as good and serviceable a name as "the comb-like wheat-grass," which, by the way, is printed "wheat-*Fern*" in the plate. Another bibliographical error is the spelling of proper specific names with small letters; thus we find *Panicum crusgalli*, *P. helopus*, *Cynodon dactylon*, though the capital is used in the case of personal names, e.g. *Brownii*, *Munroi*. Apart from these matters of detail, the book forms a well-arranged and useful manual, and will prove a serviceable handbook to those interested in the grasses of the colony, either from a purely botanical or from an agricultural point of view.

Part vi. of Drs. Ascherson's and Graebner's *Synopsis* contains the conclusion of vol. i. (pp. 401–415), comprising the completion of *Hydrocharideæ* and the index, with title-page, author's preface, and dedication to "Ihrem Freunde und Gönner Georg Schweinfurth." The rest of part vi. consisting of pp. 1–64 of vol. ii. and part vii. (pp. 65–144) are occupied with the Grasses, and include the greater part of the order. Their arrangement differs somewhat both from that of Bentham, elaborated for the *Genera Plantarum*, and from the more recent one adopted by Hackel in Engler's and Prantl's *Pflanzenfamilien*. Thus, while accepting Bentham's two great subfamilies, *Panicoideæ* and *Poæoideæ*, the authors have adopted a somewhat different arrangement of the individual tribes. *Paniceæ* contains the following:—(1) *Coleantheæ*; (2) *Oryzeæ*; (3) *Phalarideæ*; (4) *Andropogoneæ*; (5) *Maydeæ*; (6) *Zoysieæ*; and (7) *Paniceæ*. Tribes 1 and 3 are placed both by Bentham and Hackel in the second set. *Coleantheæ* contains the single genus *Coleanthus* Seidl., which, by the way, must give place to *Antoschmidtia* Steud. Both *Phalarideæ* and *Oryzeæ* might be included in the second series, where they stand side by side in the arrangement of South African Grasses recently adopted by Dr. Stapf. The second subfamily comprises nine tribes, viz. (1) *Chlorideæ*; (2) *Stupeæ*; (3) *Nardeæ*; (4) *Agrostideæ*; (5) *Aveneæ*; (6) *Pappophoreæ*; (7) *Arundineæ*; (8) *Festuceæ*; and (9) *Hordeeæ*. *Stupeæ* is from *Stupa*, a form of spelling adopted by Dr. Ascherson in 1864, in his Brandenburg Flora, on the ground that *Stipa*, the name given to the genus by Linnæus, was nonclassical. Classical or not, *Stipa* must stand; we note, however, that Dr. Smith, in his well-known Latin Dictionary, gives under *Stuppa*, also *Stupa* and *Stipa*. A similar change, on etymological but insupportable grounds, is *Dinaeba* Delil., which is

adopted for the original *Dinebra* Jacq. Fortunately such details do not detract much from the great value of the work as a whole. We regret to note that the issue of the parts in question was delayed by the veteran Dr. Ascherson's illness. We wish him good health and strength, and a speedy completion of the *Synopsis*.

The third part of M. Husnot's work on Grasses, on the same lines as parts i. and ii., carries us from *Atropis* to *Serrafalcus*. The plates are poor, and distinctly inferior to those previously published in spite of the hope expressed with part i. that an improvement would be manifest in subsequent issues. The author is also draughtsman and lithographer, and has likewise compiled and illustrated books on the Mosses and Hepatics of France and the neighbouring countries; and one is fain to doubt whether he has been able to give that critical attention which so critical a family as the Grasses demands. At any rate, the British botanist will still want a satisfactory account of the order, an account to which the accompaniment of good plates, showing both habit and floral dissections of every species, is indispensable. The part, like parts i. and ii., is issued without date. It was received in the Department of Botany of the British Museum on Dec. 3rd, 1898.

A. B. Rendle.

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*ARTICLES IN JOURNALS.**

Annals of Botany (March). — D. T. Macdougal, 'Symbiotic Saprophytism' (2 pl.). — F. C. Newcombe, 'Cellulose-Enzymes.'— H. H. Sturch, '*Harveyella mirabilis*' (2 pl.).—E. S. Salmon, 'The genus *Fissidens*' (3 pl.). — A. H. Trow, 'Biology and Cytology of *Achlya americana* var. *cambrica*' (3 pl.).—I. H. Burkill, '*Pelargonium rapaceum*.'—D. H. Scott, '*Meduilosa anglica*, sp. n.' (Cycado-filices). —J. Ll. Williams, 'New Fucus hybrids.'

Bot. Centralblatt (No. 10).—H. de Vries, 'Ueber die Abhängigkeit der Fasciation vom Alter bei zweijährigen Pflanzen.' — H. Hallier, 'Was ist *Boldoa repens* Spr.?' — K. Friderichsen, 'Die Nomenclator des *Rubus thyrsoideus*.' — (No. 11). F. Ludwig, 'Ein neues Vorkommen der *Sepultaria arenosa*.' — (Nos. 11–13). M. Britzelmayr, 'Revision der Diagnosen von Hymenomyceten-Arten.' — (No. 12). N. C. Kindberg, 'Studien über die Systematik der Laubmoose' (cont.).—(No. 14). V. Grégoire, 'Les cinèses polliniques dans les Liliacées.— R. Gutwinski, 'Ueber in der Umgebung v. Karlsbad gesammelte Algen.'

Bot. Gazette (18 Feb.). — C. S. Sargent, 'New or little-known N. American trees.'—H. C. Cowles, 'Dune Floras of Lake Michigan.' —B. M. Duggar, *Sporotrichum globuliferum*.—W. W. Rowlee, *Salix Pringlei*, sp. n.—W. M. Canby, *Silphium lanceolatum*, sp. n.

Bull. de l'Herb. Boissier (16 Feb.). — R. Chodat, 'Alphonse de Candolle à l'Université de Genève.'—F. Stephani, 'Species Hepati-

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

carum' (cont.). — O. & B. Fedtschenko, 'Plantes de Boukharie.'— J. Bornmüller, *Silene schizopetala*, *Asperula asterocephala*, *Stachys fragillima*, spp. nn.—A. Cogniaux, *Bulbophyllum cryptanthum*, sp. n. —A. Finet, 'Notes sur les Orchidées' (1 pl.). — J. Huber, *Dipterosiphon*, n. gen. (Burmanniaceæ: 1 pl.). — F. N. Williams, 'Les *Cerastium* du Japon.'

Bull. Soc. Bot. France (xlv. 6–8; March). — C. Guffroy, 'Anatomie végétale et classification.' — E. Drake del Castillo, 'Deux genres de Rubiacées d'Afrique' (*Danais & Gaertnera*).— —. Perrot, 'Théories morpho-géographiques de M. de Wettstein.'— E. Malinvaud, *Agrostis filifolia* var. *narbonensis*. — D. Clos, '*Vicia narbonensis* L. & *V. serratifolia* Jacq.' — L. Lutz, 'Roses prolifères.' — R. Zeiller, '*Glossopteris* dans le permien der Russie.' — —. Hy, 'Variations de l'*Equisetum arvense*.' — P. Guérin, 'Téguments séminaux des Graminées.' — E. A. Finet, 'Orchidées recueillies au Yunnan et au Laos.'—A. Dezanneau, 'Sur le genre *Nasturtium*.' — De Coincy, '*Juniperus thurifera*.' — E. G. Camus & —. Duffort, 'Orchidées hybrides du Gers.'—E. Heckel, 'Germination du *Ximenia*.'—G. Camus, 'Flore de la Chaine Jurassique.'—F. X. Gillot, '*Pteris aquilina* var. *cristata*.'

Bull. Torrey Bot. Club (8 Feb.). — W. M. Kozlowski, 'Primary synthesis of proteids.' — C. W. Hope, *Asplenium Glennei*. — C. H. Peck, 'New Fungi.'—B. D. Halsted, 'Mycological Notes.'—E. G. Britton, 'A new Tertiary fossil Moss' (*Rhynchostegium Knowltoni*).

Erythea (1 March). — G. Hansen, 'Lilies of Sierra Nevada.'— W. A. Setchell, 'Collecting and preserving Marine Algæ.'

Gardeners' Chronicle (11 March).—*Pinus Montezumæ* (fig. 53).

Journal de Botanique (March). — P. van Tieghem, 'Sur les Coulacées.' — M. Tswett, 'Sur la membrane périplasmique.' — E. Bonnet, 'Plantes vasculaires de la Tunisie.' — M. Goldflus, 'Assise épithéliale et antipodes des Composées' (6 pl.).—E. Roze, 'Florule française de Charles de l'Escluse' (contd.).

Oesterr. Bot. Zeitschrift (March).—V. Folgner, 'Zur Kenntniss der Entwickelungsgeschichte einiger Süsswasser-Peridineen.' — K. Rechinger, 'Vergl. Untersuchungen über die Trichome de Gesneriaceen' (1 pl.).—F. Arnold, 'Lichenologische Fragmente' (cont.).

BOOK-NOTES, NEWS, &c.

At a meeting of the Linnean Society on Feb. 16th, Mr. Clement Reid exhibited some fruits of *Najas minor* and *N. graminea*, found during a further examination of the interglacial deposits at West Wittering, in Sussex. Dr. A. B. Rendle exhibited specimens of a freshwater alga (*Pithophora*) new to Britain, which will be described in this Journal. Messrs. I. H. Burkill and C. H. Wright read a paper "On some African *Labiatæ* with Alternate Leaves," a peculiarity which had been recently used by M. Hua to characterize a new genus, *Icomum*. To this genus three new species were added. Its affinity was said to be with *Æolanthus*, in which certain

irregularities in the arrangement of the bracts of the inflorescence and flowers might be observed.

At a meeting of the same Society on March 2nd, Mr. G. C. Druce read a paper on the occurrence in Ireland of *Carex rhynchophysa*, as reported in this Journal for 1893, p. 33 (t. 332), and gave reasons for believing that *Carex rostrata* var. *latifolia* had been mistaken for it. Typical specimens of both were exhibited, and also a coloured drawing by Mr. N. E. Brown of one of the plants collected by Mr. Lloyd Praeger near Mullaghmore Lough, Armagh. At the same meeting Mr. Edward Step read a paper on the fertilization of *Glaux maritima*. After examining some hundreds of flowers gathered along the coast near Portscatho, Cornwall, he had come to the conclusion that the flower is protogynous. When open, the calyx-lobes at first separate but slightly, affording only a narrow entrance. The curvature of the style is sufficient to bring it within the fold of a calyx-lobe, from which the stigma projects so as to be in the way of any insect that visits the flower for the liquid that exudes from the ovary and base of the style. When the yellow pollen is shed, the style is either quite erect, or retains its original bend sufficiently above the anthers to make self-fertilization probable. Owing to the lowly habit of the plant and its customary crowding in with sea-sedge and grasses, it is not an easy one to watch. Doubtless it is often fertilized with its own pollen by the agency of flies and other insects; but, from the position and precocity of the stigma, Mr. Step considered that cross-fertilization is quite as frequent. He was consequently unable to agree with Mr. Henslow (Trans. Linn. Soc., n. s. Bot. i. 1880, p. 377, pl. 44, fig. 35) as to self-fertilization in this plant, believing his conclusion to have been drawn from the examination of an abnormal specimen.

Mr. F. N. Williams has published a second edition of the "Provisional and Tentative List of the Orders and Families of British Flowering Plants," which was noticed in this Journal for 1896 (p. 47). Copies may be obtained from the author, 181, High Street, Brentford, for sevenpence, post-free.

The *Strand Magazine* for March prints a letter by General Gordon on the Garden of Eden, in which occurs a reference to "The Laodicean Seychellarum, or Coco di Mir"!

Mr. I. H. Burkill has been appointed assistant to the Director of Kew Gardens; Mr. C. C. H. Pearson has joined the Kew staff as assistant for India.

In *Wood and Garden* (Longmans: 8vo, pp. xvi, 286, price 10s. 6d. net) Miss Gertrude Jekyll gives us one of those delightful volumes about cultivated plants which, although not strictly botanical, no plant-lover can read without profit. Under her guidance we pass from month to month in her delightful garden at Munstead, near Godalming, the place of the flowers being supplied by an admirable series of illustrations, excellently reproduced from photographs; and when we arrive at December, she has all sorts of interesting supplementary information for us

about the colours and scents of flowers and various other matters incidental to her subject. Those who have had the privilege of walking with Miss Jekyll through her beautifully because naturally arranged acres of garden and woodland, know how carefully the habit of every tree and flower has been studied, and how, as far as possible, the circumstances under which each occurs in its native state have been reproduced. No one who has seen it is likely to forget the effect of a clump of *Lilium giganteum*, ten or eleven feet high, when suddenly perceived in the distance through the woodland in which it is planted. Miss Jekyll knows books as well as plants, and the bright vigorous English in which she conveys her varied information adds an additional charm to an attractive volume.

We ought to have mentioned sooner the issue of the fourth part of Dr. Trimen's *Handbook of the Flora of Ceylon* (Dulau & Co.), which has been continued by Sir Joseph Hooker since the lamented death of the author. The present instalment, extending from *Euphorbiaceæ* to *Naiadeæ*, has been almost entirely worked out by Sir Joseph, as only the first order mentioned was left by Dr. Trimen in a state nearly ready for press. For the *Gramineæ* Dr. Trimen left no material, and this will be dealt with entirely by Sir Joseph, whose monumental enumeration of the order in the *Flora of British India* will render this an easy task. The fifth and concluding part will also include a key to the natural orders, a complete index of scientific and vernacular names, biographical matter, and maps of the rainfall and forest areas. Sir Joseph is of opinion that the flora of the island has not yet been exhaustively explored: "There are still large tracts of the Forest region which await the visits of keen collectors, and there are not a few common (some amongst the very commonest) plants of the plains of India that have not as yet been collected in Ceylon."

Mr. Hiern's *Catalogue of Welwitsch's African Plants* continues to make steady progress, contrasting favourably in this respect with most of the work done for African botany in this country. In the third portion, issued at the end of last year, the orders from *Dipsaceæ* to *Scrophulariaceæ* are dealt with in the careful and exhaustive manner which has characterized the previous portions of the work. Mr. Hiern's methods were commented upon and commended when the previous instalments of the Catalogue came under notice, and there seems no need at present to say more than that they have been adhered to in the part before us, with results as to nomenclature which will not commend themselves to those who would make consistency and historical accuracy subservient to convenience. The importance of the magnificent set of Welwitsch's plants in the National Herbarium is shown by the number of new species here described of genera which have already been worked up, so far as the material there went, at Berlin. The bibliographical part of the work is, as usual, most accurate and thorough. It may be noted that Welwitsch's genus *Adenogonum*, figured in this Journal for 1898, is reduced to *Engleria*, of which it forms a new species.

The *Annales du Musée du Congo* are to be issued in four series, and the first two instalments of the *Illustrations de la Flore du Congo*, by MM. Em. de Wildeman and Th. Durand, are before us. Each contains twelve admirably executed plates of interesting and new species, with full descriptions, each of which occupies a separate page, so that when the work is complete it will be possible to arrange the whole systematically. Among the more remarkable plants figured may be named the Leguminous genus *Dewevrea*, established last year by M. Micheli, the exact position of which in the order is for the present doubtful, owing to the absence of fruit; *Scaphopetalum Thonneri*, an addition to the plants which furnish homes for ants; two species of *Cogniauxia*; a new *Turræa* (*T. Cabræ*); O. Hoffmann's genus *Msuata*, allied to *Herderia*; and representatives of various species of *Vernonia*, *Oxalis*, and other large genera, the illustrations of which, in the absence of specimens, are extremely valuable.

The *Gardeners' Chronicle* for March 4 contains a notice of the Rev. Canon James Mourant DuPort, who died at Denver Rectory, Norfolk, on Feb. 21. He was born at St. Peter's Port, Guernsey, on April 14, 1832, and graduated B.A. at Cambridge in 1855. He had a good general knowledge of botany, but was best known as a mycologist, and for many years attended the "forays" of the Woolhope Club, to the *Transactions* of which body, as well as to those of the Norfolk and Norwich Natural History Society, he contributed papers. His name is commemorated in *Russula DuPorti* Phillips.

The latest (March) issue of the *Icones Plantarum* contains an important series of plates illustrating the genus *Hevea*, of which Mr. Hemsley describes a new species. Mr. Hemsley, who is responsible for the bulk of the number, also figures the male inflorescence of his Pandanaceous genus *Sararanga*, and describes as a new genus (*Moseleya*), *Sibthorpia* (*Hornemannia*) *pinnata* Benth. We are sorry to see that the useful practice of lettering the plates has been discontinued.

Bryological science has sustained an irreparable loss in the death of its greatest master, Dr. Carl Müller, of Halle, on the 9th of February. Though in his eighty-first year, this venerable botanist manifested to the last an unexampled vigour in his special line of research, and has left behind him papers which are still in course of publication. Indeed, it is doubtful whether at any period he surpassed the rate of production of new species with which he has marked the closing years of his life. It should be noted that he has already celebrated the jubilee of the earlier parts of his *Synopsis Muscorum*, which was issued in ten fascicles between November, 1847, and August, 1851. At the time of its appearance it described all the known mosses of the world—two thousand three hundred and three species; now-a-days, however, the burden of species has been raised to nearly fourteen thousand, mainly through the continued efforts of the veteran bryologist, now alas! taken from us.—A. G.

Erratum.—P. 143, l. 10, for "203" read "23."

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CONTENTS.

	PAGE
Radnorshire and Breconshire Rubi. By the Rev. W. MOYLE ROGERS, F.L.S.	193
Apodachlya, a Genus of Fungi new to Britain. By ANTONY GEPP, M.A., F.L.S.	198
Canarian and Madeiran *Crassulaceæ*. By R. P. MURRAY, M.A., F.L.S.	201
Wayfaring Notes in Rhodesia.—No. III. By R. FRANK RAND, M.D., F.L.S. (continued)	204
Critical Notes on some Species of *Cerastium*. By FREDERIC N. WILLIAMS, F.L.S. (continued)	209
The Alga-Flora of Cambridgeshire. By G. S. WEST, B.A., A.R.C.S. (Plate 396) (continued)	216
SHORT NOTES. — Scottish Rubi.—Cumberland Plants.—*Buxbaumia aphylla* in Worcestershire. — Terms used to denote Colour.—*Clusmatocolea cuneifolia* Spruce. Petiver's Exsiccatæ	225
NOTICES OF BOOKS:— Recherches anatomiques et physiologiques sur le *Tradescantia virginica* L. Par A. GRAVIS, Professeur à l'Université de Liège	228
Histoire de la Pomme de terre. Par ERNEST ROZE	232
A Biographical Index of British and Irish Botanists. By JAMES BRITTEN, F.L.S., and G. S. BOULGER, F.L.S.	235
Articles in Journals	236
Book-Notes, News, &c.	237

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THE JOURNAL OF BOTANY was established in 1863 by Dr. Seemann. In 1872 the editorship was assumed by the late Dr. Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

Without professing to occupy the vast field of general Botany, the Journal has from its inception filled a position which, even now, is covered by no other periodical. It affords a ready and prompt medium for the publication of new discoveries, and appears regularly and punctually on the 1st of each month. While more especially concerned with systematic botany, observations of every kind are welcomed. Especial prominence has from the first been given to British botany, and it may safely be said that nothing of primary importance bearing upon this subject has remained unnoticed.

Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains. Many important monographs and other works first appeared in its pages. In 1896 it became necessary to increase its size, owing to the number of papers sent for publication: the number of plates was at the same time augmented.

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RADNORSHIRE AND BRECONSHIRE RUBI.

By the Rev. W. Moyle Rogers, F.L.S.

These notes are supplementary to those on the general Flora of Radnorshire and Breconshire published in the January number of this Journal, and so refer only to Rubi seen by me in those counties last summer, in the vast majority of cases in the living bushes, but in the few instances where the name of the locality is followed by that of Rev. A. Ley or F. A. Rogers, in the form of freshly cut specimens. As in the former paper, an asterisk will be prefixed in those cases where I believe there has been no previous record of the plant for the county.

The common brambles of the Wye Valley throughout that part of it in which the river marks the boundary between the counties of Radnor and Brecon, or, in other words, from Rhayader in the N.W. to Hay in the S.E., are *R. Lindleianus*, *Silurum*, *clivicola*, *rusticanus*, *leucostachys*, *pallidus* Bab. (non Wh. et N.), and *dumetorum*. These are so generally distributed throughout the district that one can hardly fail to find them all in the course of an hour's search in any part of it which may be favourable to the growth of brambles. Fairly frequent and locally abundant in the same district occur *R. Idæus*, *plicatus*, *incurvatus* (forma), *pulcherrimus*, *villicaulis*, *Selmeri*, *hirtifolius*, *pyramidalis*, *angustifolius*, *longithyrsiger* and *britannicus*. All the other species and forms that I saw are distinctly local, though two or three of them are found in such quantity as to be characteristic of certain localities.

In the Presteign neighbourhood, at the eastern corner of Radnorshire, the brambles mentioned above as generally distributed in the Wye Valley, are still the common ones. though here *R. longithyrsiger* must be added to that list; while *R.plicatus*, *villicaulis* and *britannicus* must, so far as my observation went, be taken from the list of the "locally abundant." The central and N.E. parts of Radnorshire, and most of Breconshire S.W. of the Wye Valley, I was unable to reach.

For help in determining some of the forms I am much indebted to Dr. Focke and Mr. Ley. 42 and 43 are the comital numbers assigned to Brecon and Radnor in Watson's *Topographical Botany*.

Rubus Idæus Linn. Apparently far from common. 42. Duhonw Glen, and occasionally by the Wye near Builth. 43. Hills near Rhayader, abundant. Llanelwedd. Near Presteign.

Var. *asperrimus* Lees. *42. By the Wye at Builth. *43. Llanelwedd. A mere form rather than a distinct variety.

Suberecti.

R. fissus Lindl. 42. Glanau Wells, Builth; a very strong tall form of this species. 43. Hillside, Rhayader, in plenty.

R. suberectus Anders. 43. Thickets near Rhayader, apparently in no great quantity.

R. plicatus Wh. et N. Near Glanau Wells, Builth; a form with exceptionally long acuminate leaf-point. By the Wye above

Builth. Altmawr. 43. Hillside, Rhayader; in great quantity. By Newbridge-on-Wye. Near Builth Road Railway Station. The plant growing above Builth, by the Wye, 42, is var. *Bertramii* G. Braun, or a long-stamened form intermediate between it and typical *plicatus*.

Rhamnifolii.

This group is far more richly represented than any other.

R. carpinifolius Wh. et N. Uncommon. 43. Near Presteign. Newbridge.

R. incurvatus Bab. Quite the typical plant (as I understand it) occurs in Duhonw Glen *(42), and on a hillside near Rhayader *(43). A second form, distinct enough to be recognized at a glance and yet perhaps hardly needing a varietal name, is quite frequent and locally abundant. 42. Newbridge, in great quantity. About Builth and in the Yrfon Valley, abundant. 43. Rhayader; Newbridge; near Builth Road Junction; Llanelwedd; Aberedw. This second form differs from the type in leaves thinner, with closer, greyer felt beneath, and teeth much less compound and less deeply incised, and terminal leaflet usually narrower and less cordate; and especially in the broader and more leafy panicle, with longer lower branches and with leaves nearly to the top (instead of with upper half or "two-thirds" leafless). The stem is also less deeply furrowed, the prickles are slenderer and longer, and the sepals are more conspicuously sub-patent on the fall of the petals. So it may be said to go off from typical *incurvatus* towards *R. carpinifolius* and *R. rhombifolius*.

R. Lindleianus Lees. Undoubtedly one of the most generally distributed, as it is one of the most constant and easily recognized species. Noted for six distinct localities in 42, and for fourteen in 43.

R. erythrinus Genev. 42. Llangorse Common, *F. A. Rogers*! Near the junction of the Yrfon and Wye above Builth (42) Mr. Ley showed me an interesting form, growing in fair quantity, which was new to both of us, and seems intermediate between *R. erythrinus* and *R. durescens* W. R. Linton.

R. rhamnifolius Wh. et N. Rather local. 42. Near Builth, *A. Ley*!; Llangorse Common. *43. Near Presteign; Llowes; Llanelwedd.

R. Silurum A. Ley. Quite common and constant in character. 42. Builth neighbourhood, everywhere; Newbridge; Altmawr; Llangorse Common; Talgarth and Glasbury Road. 43. Most abundant at Rhayader, Newbridge, Builth Road, Llanelwedd, and Aberedw; Boughrood; Presteign. A very handsome and exceedingly well-marked bramble. The long ultra-axillary panicle and light green foliage are constant and conspicuous features. The pale petals have a peculiar lilac tint, and the bracts are usually gland-ciliate.

R. pulcherrimus Neum. Widely but rather thinly spread. 42. Builth neighbourhood; Llangorse Common; Talgarth and Glasbury Road; Three Cocks Hotel neighbourhood; Hay Hill. 43. Rhayader; Clyro; Boughrood; Stanner Rocks; Presteign.

Var. or subsp. *cinerosus* Rogers. *43. Sillia; Presteign. This is the highly glandular *pulcherrimus*-like bramble for which I suggested this name in Bot. Exch. Club Report for 1896, p. 513, substituting *cinerosus* for *setosus*, which I had adopted before discovering from *Index Kewensis* that there is an older *R. setosus* Bigel. For descriptive notes, and some account of its distribution in England and Ireland see Journ. Bot. 1891, 240; 1895, 48, 49; 1897, 410. First observed by me in 1890, in several places near Helmsley, in N.E. Yorkshire. Apparently unknown on the Continent.

R. Lindebergii P. J. Muell. Local. 42. Yrfon Valley. 43. Corton Wood, Presteign; hillside near Builth Road Station.

R. villicaulis Koehl. Locally very abundant. *42. By the Wye above Builth and at Altmawr; Llangorse Common. *43 Near Builth Road Railway Station. In all these localities like the common Scottish and Dorset plant which Dr. Focke tells us is the typical *villicaulis* of E. Germany (see Journ. Bot. 1897, 45). In the Welsh plant, especially as it grows on Llangorse Common, the leaves are, however, more frequently 3–4-nate (instead of 5-nate) than I have seen elsewhere.

Var. *Selmeri* (Lindeb.). Less frequent than the typical plant. 42. Yrfon Valley and by the Wye above its junction with the Yrfon; Llangorse Common, abundant. *43. Newbridge; Presteign.

R. leucandrus Focke. *42. Yrfon Valley, near Builth, *A. Ley*! Thus named without qualification by Dr. Focke, and perhaps rather nearer to the typical plant of the Continent than our Hants and Dorset form; but the name as applied by its author seems to cover a considerable range of variation.

R. argentatus P. J. Muell. Decidedly uncommon. Builth neighbourhood, 42 and 43. Llowes, 43.

Var. *Clivicola* A. Ley. One of the commonest and most characteristic brambles everywhere in and near this part of the Wye Valley. 42. Hay and Builth neighbourhoods; Three Cocks Railway Junction; Talgarth; Llangorse Common. 43. Rhayader to Glasbury, and Llowes. Quite a brief study of the brambles of this part of Wales and of the neighbouring county of Hereford is sufficient to familiarize one with *R. clivicola* and *R. Silurum*, and to show how real is our debt of gratitude to Mr. Ley for distinguishing and naming them. In *R. clivicola* the roundish-obovate, cuspidate-acuminate terminal leaflet is especially characteristic, with its wavy edge, and its ashy felt and prominent ribs beneath. The petals seem uniformly pink in the freshly opened flower, though in bright sunshine they soon fade to white.

Unless we include *R. argentatus* and its varieties in our small *Discolores* group (as I am now disposed to include it), *R. rusticanus* Merc. would be the only representative of that group that I saw. It is widely distributed, without being always very abundant. 42. Builth and Hay neighbourhoods; Three Cocks; Talgarth; Llangorse. 43. Stanner Rocks; Presteign; Wye Valley from Builth Road to Boughrood and Clyro.

Silvatici.

R. macrophyllus Wh. et N. Apparently very rare. *43 Between Clyro and Llowes, *F. A. Rogers*! So named by me with some hesitation, and then submitted to Dr. Focke, who wrote, "Not very typical, but I agree in naming the specimen." This criticism would, I believe, apply equally well to most of our British "*R. macrophyllus*." Quite the typical plant I believe to be rare amongst us.

Var. *Schlechtendalii* Weihe. Uncommon. 42. Between Hay and Cusop Dingle. 43. Aberedw; Boughrood; Llowes.

R. Sprengelii Weihe. Seen only in one spot, near Glanau Wells, Builth, 42; but quite typical there.

R. hirtifolius Muell. et Wirtg. I agree with Mr. Ley in thus naming one of the more frequent brambles throughout that part of the Wye Valley which I explored. 42. From Newbridge to Three Cocks R. Junction. *43. Aberedw; Boughrood, &c.

R. pyramidalis Kalt. At least as widespread through the same country as the last, but often seen only in small quantity. 42. Builth and Three Cocks Junction neighbourhoods. Llangorse Common. 43. Rhayader; Newbridge; Aberedw; Boughrood.

R. leucostachys Schleich. Very common in 42 (Hay, Builth, &c.) and 43 (Rhayader, Llanelwedd, Llowes, Presteign, &c.).

Var. *angustifolius* Rogers. *43. Stanner Rocks; Old Radnor, *F. A. Rogers*!; Aberedw; Erwood; Llowes.

Egregii.

This and the three following groups,—in other words, the more glandular brambles generally,—are very thinly represented throughout the districts visited.

R. mucronatus Blox. Typical plant not seen. In Corton Wood, Presteign (43), Mr. Ley pointed out to me an allied form, abundant there, which he distinguishes by the MS. name *R. mucronatoides*. Perhaps it may be included in an aggregate sense under *mucronatus*, but it goes off from ordinary forms of that species somewhat towards *R. melanoxylon*. In the same wood (as also, in greater quantity, in the neighbouring Stapleton Wood, Herefordshire) occurs a handsome bramble which Dr. Focke considers "allied to *R. Gelertii*." In some respects it is intermediate between that and our British var. *criniger*, which it reminded me of before I sent it to Dr. Focke.

R. Drejeri G. Jensen. *42. Talgarth and Builth Roads, near Three Cocks Junction. The typical plant, I believe, but seen only in two spots. Near Hay Bridge (43) grows what may be a weak shade form of the same species, though apparently somewhat intermediate between it and *R. mucronatus*.

Subsp. or var. *Leyanus* Rogers. 43. By the Wye at Boughrood, abundant; near Llowes,

Radulæ.

R. echinatus Lindl. *42. Roadside, about a mile N.E. of Three Cocks Hotel; a few bushes only seen. 43. Llowes.

R. oigocladus Muell. et Lefv. Seen only near Llowes (43).

R. Babingtonii Bell Salt. 43. Roadside by R. Lug, W. of Presteign.

R. Lejeunei Wh. et N. 42. Wood near Glanau Wells, Builth, *A. Ley*! Clearly the same plant as one thus named for Mr. Ley by Dr. Focke in 1897 from Llanwrtyd in the same county.

Var. *ericetorum* Lefv. *43 Near Llowes. A frequent plant in some neighbouring parts of Herefordshire.

R. pallidus Wh. et N. *42. Near Glanau Wells, Builth, *A. Ley*!

R. longithyrsiger Bab. 43. Rhayader; Presteign, My failing to find any form of *R. radula* is remarkable.

Koehleriani.

R. rosaceus Wh. et N. A handsome form, with narrow leaves, and showing some resemblance to my var. *Purchasianus*, is abundant about Llowes, *43.

Var. *hystrix* Wh. et N. 42. Builth, Hay Road, and near the junction of the Yrfon and Wye. *43. Hillside, Rhayader.

R. Koehleri Wh. et N., var. or subsp. DASYPHYLLUS. I venture to suggest this as an appropriate new name for the widespread and locally abundant bramble which we have long tried to distinguish as "*R. pallidus* Bab. (non Wh. et N.)." It is far the commonest of all the glandular forms seen by me in Mid-Wales, as throughout most of Central and N. England; and as the true *R. pallidus* of Weihe and Nees is now also found to be widely spread in England, the continued use of the name for a plant to which it was originally given by mistake is peculiarly inconvenient. A fresh description is unnecessary here, as the form is (on the whole) so carefully and fully distinguished from its allies in Brit. Rubi, pp. 204–206. But I should perhaps point out that the leaves are far from being uniformly 5-nate, or the filaments uniformly pink, as there described; and that the sepals are, as a rule, strongly reflexed, though often rising for a short time on the fall of the petals. I think it may remain under *Koehleri* as a strongly marked var. or subsp., readily recognized as a rule by its long, narrow, lax panicle; its long, prostrate, very prickly and aciculate dull-red hairy stem; and its thick, patent-toothed leaves, yellowish green and very soft beneath. In weak forms, however, only the stem armature keeps quite Koehlerian, the intermediate prickles and strong acicles becoming comparatively few on the panicle. This common British bramble is certainly distinct from *R. hostilis* Muell. et Wirtg. (as represented by Kent and Sussex specimens named for me by Dr. Focke); and I have seen nothing from the Continent that could be placed with it. 42 & 43. Quite common.

Var. *cognatus* (N. E. Br.). *43. Llowes.

R. Marshalli Focke & Rogers, var. *semiglaber* Rogers (See Bot. Exch. Club Report 1895, 479, 480, and Journ. Bot. 1895, 103). 42. Builth neighbourhood, especially near the junction of the Yrfon and Wye; Llangorse Common; between Glasbury and Talgarth; Hay Hill. Locally abundant. Chiefly a form of hedges, and at times recalling *R. dumetorum ferox*, but with the rather large drupelets epruinose and not cæsian in flavour. This variety is

widely spread in Wales, and somewhat variable in character. It also crosses the border into Herefordshire, and is especially abundant at Cusop, near Hay.

BELLARDIANI.

R. ochrodermis A. Ley, 43. Sillia, Presteign.

R. britannicus Rogers. Fairly frequent. 42. Newbridge; near Builth; Hay Hill; Brecon side of Cusop Dingle. *43. Newbridge; Aberedw.

CAESII.

R. dumetorum Wh. et N. In an aggregate sense common in both counties, and very variable.

Var. *ferox* Weihe. 42. Builth neighbourhood; Hay Hill. 43. Llanelwedd; Llowes; Clyro; Boughrood; Presteign.

Var. *pilosus* Wh. et. N. *43. Presteign; well-marked, I think, and in good quantity.

R. corylifolius Sm. Remarkably scarce. 42. Seen only in the Hay and Three Cocks Junction neighbourhoods, and there rarely if at all typical. *43. Presteign, in good quantity. Chiefly var. *cyclophyllus* (Lindeb.).

R. cæsius L. Local. 42. Llangorse Common; from Glasbury to Hay and Talgarth. *43. Clyro; Llowes; Presteign.

Of hybrids I saw only two that I should speak of as quite unmistakable, viz. *R. cæsius* × *rusticanus*, 42. Near Three Cocks Hotel, in some quantity; and *R. clivicola* × *rusticanus*, 43. Llowes. Other crossings that I thought I recognized were the following:—

R. britannicus × *Marshalli* (forma). 43. Cusop Dingle.

R. leucostachys × *longithyrsiger*. 43. Slope below Corton Wood; Presteign.

R. pulcherrimus × *Silurum*. 43. Rocky cutting by roadside, Rhayader.

APODACHLYA, A GENUS OF FUNGI NEW TO BRITAIN.

BY ANTONY GEPP, M.A., F.L.S.

THE list of Saprolegniaceous Fungi recorded as occurring in this country is a meagre one, and calls for extension. There is little doubt that several additions could easily be made, if collectors would give their attention to the group and search for the plants described and figured by Winter in Rabenhorst's *Kryptogamen-Flora von Deutschland*, and by Humphrey in his "*Saprolegniaceæ* of the United States" (Trans. Amer. Phil. Soc. xvii. 1893). As the existence of *Apodachlya* in this country does not appear to have been noticed hitherto, a brief account of this genus and of a few other *Saprolegniaceæ* recently found with it in Shropshire may be of interest.

Last January my brother, Dr. Maurice Gepp, was investigating the state of purity of the water-supply of Meole Brace, near Shrewsbury. The water is pumped up out of an isolated coal-mine in an agricultural district, and, flowing for nearly a mile through an

underground pipe, runs into a filter-tank, and then into a roofed reservoir. Tufts of a filamentous fungus were found floating in, and attached to, the filter-tank, and entering it from the inlet-pipe. These tufts proved to be *Apodya lactea* Cornu, a rather rare plant, which is distinguished from most of the *Saprolegniaceæ* by the constrictions of the hyphæ at intervals of about 0·25 mm. The hyphæ are about 0·015 mm. in diameter, contain in each joint a few cellulin-spheres of doubtful nature, and are often plugged at the constrictions with similar spherical or ellipsoidal stoppers. The tufts were from one to three centimetres in length, and were so obscured by a brown deposit that the details of the filaments were difficult to make out. This deposit was found to be rust. It was soluble in dilute hydrochloric acid, and, upon the further addition of potassium ferrocyanide, yielded an abundant formation of prussian blue. The water in which the plant grew contained a small quantity of iron in solution. Now, it is known that some of the lowest fungi —*Leptothrix*, *Crenothrix*, and *Cladothrix*—have the power of converting ferrous bicarbonate to ferric hydrate, and they are even credited with the formation of deposits of bog-iron ores; but that *Apodya* should be capable of dealing with iron in a similar way seems to be a novel fact. The plant is saprophytic on organic matter in running water, for instance, in streams which receive the effluent waters from distilleries and paper-mills. *Apodya lactea* was originally described as an alga, and appears in English Floras under the name *Leptomitus lacteus* Ag. It should be added that there is still some doubt as to how the plant found its way into the Meole water-pipe; but the probable source was not the coal-mine, but a water-course near to the filter-tank, and flooded by a long rainy season.

A few days after sending me the *Apodya*, my brother found a broom-handle floating in the reservoir that adjoins the filter-tank. He sawed off a length of this—a stout hazel-stem—and sent it to me. It had a number of fungoid tufts upon it, chiefly springing from the lenticels; and these tufts proved very interesting when examined under the microscope, for they contained the following four or five *Saprolegniaceæ*. There was a small quantity of *Apodya*, but now clear, and not obscured by a rusty deposit; also a strong growth of *Achlya racemosa* Hildeb., producing abundant oogonia and zoosporangia; and with it was associated a very small quantity of its var. *stelligera* Cornu, and of another species—*A. spinosa* De Bary, each with oogonia; and finally a strong growth of *Apodachlya pyrifera* Zopf, with zoosporangia. These four plants do not appear to have been found in this country before, or at least to have been recorded; and in that case *Apodachlya* is an addition to our fungus-genera. It resembles *Apodya* in consisting of filaments constricted at intervals; but the intervals are much shorter—about 0·1 mm., and the filaments are only about 0·007 mm. in diameter. The specific name refers to the zoosporangium, which is usually pear-shaped. It is always formed from the apical cell of a filament or of a new branch which has sprung from immediately underneath the last-formed sporangium. When ripe, the sporangium ruptures

at the top, and the contents are extruded as a cluster of some dozen encysted spore-bodies, which remain for a time attached to the top of the empty sporangium. Then one by one the zoospores squeeze their way out of the cysts and escape. The zoosporangia vary much in size, but roughly are about 0·05 by 0·02 mm. They are produced abundantly; but as the crown of extruded spore-bodies is readily detached from the empty sporangium, it is well to harden the specimen with osmic acid before teasing it out. *Apodachlya* may be sought for on rotting *Characeæ*, as well as in the haunts of *Apodya*.

In passing on to *Achlya*, it is worth while to call to mind the difference between the zoosporangial formation in this genus and in *Saprolegnia*. In the latter the zoosporangium is apical, and each new sporangium grows up inside the empty tube of the other one. In *Achlya* the first zoosporangium is apical, and each new one is produced at the apex of a branch emitted from immediately below the preceding sporangium; and thus the axis of the hypha becomes sympodial. In *Achlya* also the extruded zoospores are retained for a time encysted in a cluster attached to the top of the empty sporangium, as in the case of *Apodachlya*, but are much more numerous—perhaps a hundred or more. *Achlya racemosa* is a common species which deserves the recognition of our mycological authorities. It had a congenial matrix in the sodden broomstick, but adapted itself readily to a diet of dead flies. Its oogonia are terminal on lateral branchlets, are spherical, contain from two to seven oospores, and are each provided with a pair of antheridia arising from the stalk-cell or from the oogonium itself. The var. *stelligera* has oogonia of similar dimensions—about 0·06 mm. diam.—but of rather angulate outline, owing to the presence of a few low prominences of the oogonial wall. The oospores are but two, and the antheridia solitary. Finally, our specimens of *Achlya spinosa* are distinctly interesting as being somewhat of a link between De Bary's types of *A. spinosa* and *A. stellata*. The oogonia measure 0·06 mm. in extreme diameter, and approach those of the latter species in their regular, stellate, unflattened outline; but the spines are fewer, sharper, and more prominent; moreover, some of the oogonia are provided with an antheridium springing from the stalk-cell, and in this way they are referable to *A. spinosa*; but the oogonia of our plant are always terminal on the main filament, or more often on short branchlets, and are never intercalated in the filament, as in the type of *A. spinosa* or in *A. cornuta* Archer, nor do they bear the strong terminal spine so characteristic of these two species—or rather synonyms—for it is doubtful whether these plants can be maintained as distinct species. They require further investigation, as also does *A. stellata*.

It would be well worth the while of mycologists to give a little time to the study of our native *Saprolegniaceæ*. How to do this for the best is well told by Humphrey, and also by Trow in his "Karyology of Saprolegnia" (*Annals of Botany*, ix. 1895). Samples of water-plants from clean streams or ponds should be collected and put in pots of pure water; and freshly-killed flies should then be added. In three or four days the flies will almost inevitably be

invested with a halo of Saprolegniaceous fungi, the growth of which can then be studied for weeks. The flies, however, should first be dipped in spirit to remove the air, and then washed in water to remove the spirit; for otherwise they float high and dry on the surface of the water. When flies are abundant, a store of them should be killed and desiccated, to enable the cultures to be carried on through the winter.

My thanks are due to Miss A. L. Smith for her kind help in the determination of the specimens.

CANARIAN AND MADEIRAN CRASSULACEÆ.

By R. P. Murray, M.A., F.L.S.

Sedum lancerottense, sp. nov. Glabrum, tortuosum, foliis subovoideis, floribus breviter pedicellatis in cymam anfractam bipartitam terminalem scorpioideam bracteatam dispositis; sepalis 5, obtusis; staminibus 10.

Hab. In rupibus abruptis el Risco dictis ins. Lancerottensis.

In May 1892 I obtained a single specimen of this species, leafless, and with only the remains of a cyme, on the cliffs of el Risco in Lanzerote. It is a most interesting addition to the Canarian flora, which, though so rich in *Sempervivum*, has till now possessed not a single *Sedum*, with the exception of the widely spread South European *S. rubens* L. *Sedum lancerottense* is nearly allied to *S. nudum* Ait. and *S. fusiforme* Lowe, both endemic in Madeira. To the former of these it perhaps comes nearest by its leaf characters and in the number of its stamens, but it differs widely in habit. Leaves pale green. Cymes remarkably wavy, almost recalling the arched internodes of *Ranunculus reptans* L. Perennial. Described from cultivated specimens.

Sempervivum percarneum, sp. nov. S. caule frutescente, ramoso; foliis anguste spathulatis glabris, acuminatis, serrato-ciliatis; floribus carnosis in thyrsum latum digestis; ramulis puberulis; calycis puberuli dentibus lineari-triangularibus; squamis perigynis inconspicuis (aut nullis).

Hab. In insulis Canariensibus.

One of the most conspicuous plants of the genus in Gran Canaria. It is difficult to understand how it has so long remained without a name. It grows abundantly about Guia, and also in and near the Caldera de Bandama, both these localities being in the north of the island. The only specimen which I have seen from any of the other islands is at Kew, where it is placed in a packet marked "*S. Youngianun* Webb." The sheet is labelled, I believe, in Gay's handwriting, from whose herbarium it was received, "fleurs violettes Ile de Fer, in rupestribus el Golfo, 2 Mai 1855. H. de la Perraudière," and bears a MS. name. It agrees exactly with Canarian specimens. There is a single sheet of *S. percarneum* in Webb's herbarium at Florence. To show the confusion into

which these plants have fallen, it may be worth while to notice the mixture of species which have been associated with it. There are two packets each labelled *Æ. Doramæ*. The first contains (so far as my notes record) only one sheet from Gran Canaria. It is a plant with the habit of *S. barbatum*, and was at first so labelled. Can it represent the *Æonium Bentejui* of Webb's syn. ined., of which nothing definite seems to be known? The second packet contains three sheets:—No. 1, a plant with yellow flowers and glandular pedicels, marked "*Æonium Doramæ ? ?*" A second label with the suggestion of *S. holochrysum* has been crossed out. No. 2 is, if I rightly remember, the same. No. 3 is marked "332 *S. ciliatum* Willd. fleurs rougeâtres. Gd. Canaria." Nos. 1 and 2 are probably *Æon. Manriqueorum* Bolle (= *Æ. Doramæ* Webb), that is, in my belief, *S. arboreum* L. No. 3 is *S. percarneum*. This is a very easily recognizable species, quite distinct from all others in the colour of its flowers, and in the peculiar slight, almost scurfy clothing of the flowering branches. Mr. Gelert, who was kind enough to make a re-examination for me of fresh specimens in 1896, could find no "perigynous glands." I sometimes thought that I could detect them, but was never quite satisfied as to their presence. Flowers in May.

SEMPERVIVUM ARBOREUM L. Lowe (Man. Fl. Mad., 337, 338) says that he found this species abundantly and apparently quite wild in two or three islands of the Canarian archipelago; and quotes Tenerife (Barranco de Martianez), Hierro (El Golfo), and Lanzerote (El Valle). There are specimens from Tenerife and Hierro at Kew, but I cannot think that they are rightly referred to *S. arboreum*. Indeed, so far as the Barranco Martianez is concerned, I feel perfectly sure that *S. arboreum* does not occur there, but that *S. holochrysum* was mistaken for it. I think that the Hierro plant is also probably *S. holochrysum*. The Kew specimens from both localities seem to have the panicle branches quite glabrous, which would not accord with *S. arboreum*. I have not seen the Lanzerote plant. But in 1894 (April 30), I gathered a plant at El Dragonal in Gran Canaria which I was able with considerable assurance to refer to *S. Manriqueorum* (Bolle) = *S. Doramæ* (Webb), a plant which I now believe to be identical with *S. arboreum* L. It agrees perfectly with a Portuguese specimen of this latter, and is well distinguished from any other Canarian species of this group by the clothing of the panicle, which is well described by Lowe as 'furfuraceo-puberulous.' My plant grew on a wall, close to a small hamlet, so that the locality may not be quite above suspicion, though I do not think it had been planted. It was in fair quantity, but only one specimen was in flower. Bolle says of his *Æonium Manriqueorum*, 'Hab. in Canaria Magna frequens: La Vega de S. Brigida: Barranco de Tenteniguada: El Dragonal: Monte Doramas.' It is a great satisfaction to have solved (as I hope) the problem of the original home of *S. arboreum*. I believe that all the European and North African localities quoted for it are open to doubt, and I suspect that "garden escapes, naturalized," would be their proper description.

SEMPERVIVUM BARBATUM Chr. Sm. This species derives its name from the long capillary adventitious rootlets with which it is said to be clothed, but I have never seen such a specimen, and most of the Canarian species of the genus are liable to the same peculiarity under certain circumstances. There is only a single sheet of the species in Webb's herbarium. The specimen has no radicles, and is labelled "Hort. Paris." My own plant, collected above Agua Mansa, in Tenerife, shows no trace of them, and Bourgeau's exsiccata under this name are in the same condition, so far as I have seen them. I can in no way distinguish these Tenerife plants from those which I collected in many places in Palma, which are the *Æonium cruentum* of Phyt. Can. Probably *Æ. Bentejui* Webb and *Æ. strepsicladum* Webb Berth. should also be placed under *S. barbatum*, which, being the oldest name, must be retained, however inappropriate to the usual condition of the species.

SEMPERVIVUM MEYERHEIMII (Bolle). In 1859 Bolle described (Bonpl. vii. 239), under the name of *Æonium Meyerheimii*, a *Sempervivum* from Madeira which does not seem to have been since noticed by any other botanist. In June, 1895, I found a few plants, which I think may belong to it; at least the single root which I was able to coax into flower answers fairly well to his description, as does also the locality "in rupestribus apricis non procul ab urbe Funchal." My plants were collected near the base of the sea-cliffs, about two miles to the east of that town. I believe that they were of hybrid origin (*S. glandulosum* × *glutinosum*), and that they do not constitute a distinct species. The inflorescence is quite that of *S. glandulosum* Ait., while the leaves are much nearer those of *S. glutinosum* Ait., and do not form a flat rosette as in *S. glandulosum*. The ciliæ, which are nearly as broad as long, and transparent, also agree with those of *S. glutinosum*. The few plants which I saw all grew close together, and both the supposed parents are exceedingly common in Madeira. I should add that the peculiar and (from a collecting point of view) most unpleasant viscidity of *S. glutinosum* was entirely absent.

Hybrids seem to be extremely rare in the genus, but I see that Nyman quotes two or three in his *Conspectus*.

SEMPERVIVUM PAIVÆ Lowe (Hook. Bot. Mag. t. 5593). This is the oldest name: *Æonium Castello-Paivæ* Bolle is the same plant.

SEMPERVIVUM SEDIFOLIUM H. Chr. (*Aichryson sedifolium* Bolle. *Greenovia sedifolium* Webb, syn. ined. ex Bolle.) I found this species very sparingly in Palma, on rocks by the roadside near Candelaria, in June, 1892. It was before this known only from one spot in Tenerife, La Hermita de Masca, near Santiago. The habit is much like that of *S. Saundersii* H. Chr.

SEMPERVIVUM TABULÆFORME Haw. We must, I think, on the whole, hold Lowe correct in supposing a mistake to have been made in ascribing this species to Madeira. Haworth's description is very brief, and runs thus:—"S. tabulæforme, subcaulescens foliis densissime imbricatis et in planum rotundatum absolute

depressis, ciliatis nudis. Hab. in Madera." But the leaves in the Madeira plant are always more or less pubescent, whereas in the allied species, so common on the north coast of Tenerife, they are always glabrous, which I suppose to be what Haworth means by "*nudis*." Therefore I follow Lowe in adopting *S. tabulæforme* as the name for the Canarian plant, especially as no great stress can be laid on the accuracy of localities in Haworth's time.

At a later date the Tenerife plant has received two other names: *Æonium Berthelotianum* Bolle (Bonpl. 1859) and *Sempervivum macrolepum* H. Chr. (taken up from Webb, syn. ined.). It is quite certain that these two names refer to the same plant. I have examined both in the localities ascribed to them (they are only a few miles apart) by their respective authors.

I am unable to say whether Lowe is correct in his statement that *S. glandulosum* Ait., so often supposed to be Haworth's plant, occurs in small quantity, intermixed with abundance of *S. tabulæforme*, between Icod de los Vinos and Garachico (Tenerife). I have only seen the latter there.

Sempervivum viscatum H. Chr. The representative in Gomera of the Tenerifian *S. Lindleyi* H. Chr., under which I think it should be placed as a geographical race or subspecies. Bolle distinguishes it by the more sparing pubescence, the brighter green of the leaves, the weaker resinous smell, and the floral divisions, 12- instead of 6-partite. This last character was taken from dried specimens, but he believed it to be constant. It is, however, not so. In all that I was able to examine (May, 1894) the calyx was 6-partite. The leaves are, however, distinctly longer and narrower than in *S. Lindleyi*. The other differences pointed out by Bolle seem to be of little moment.

Dr. Christ seems to have been the first author to place several of the Canarian species in their correct genus (*Sempervivum*) in the list published by him in Engler's Bot. Jahrbüchern, 1887. I have therefore ascribed them to him. They were for the most part originally published under *Æonium*.

WAYFARING NOTES IN RHODESIA.—No. III.

By R. Frank Rand, M.D., F.L.S.

(Continued from Journ. Bot. 1898, p. 348.)

September may be regarded as the first month of spring in Mashonaland. In Matabeleland, lying to the S.W., the season is about a fortnight later. Few rains have fallen at this time, October being the first month in which they may be confidently looked for. The veldt, black hitherto from the veldt fires, is now bright with the early spring flowers. These come up in advance of the rains. Notable among the trees which are coming into foliage is the Masasa (*Brachystegia*), whose remarkably rich spring tints have already been referred to.

The early flowers of this spring season come up most abundantly and readily where the ground has been cleared of grass by fire, or, as in the neighbourhood of Salisbury, by scythe. As explanation, it seemed to me that the clearing enabled the sun's rays to get at the ground, so warming these firstlings into activity; but a more potent factor, I think, is the one suggested by my friend Mr. Wm. Smith, of Salisbury, *viz.* that the dew is now condensed directly upon the ground, and not upon the tangle of dry grass stalks as before, whence most of it would be dissipated by evaporation,

Among the earliest and most striking of the veldt flowers to appear are the following; they are all abundant, and their rich colours beautify what has hitherto been sun-baked and fire-ridden veldt:—

Gnidia. Four species noted. Two of them tender herbaceous plants with yellow flowers; one glabrous-leaved, the other with leaves coated with soft silky hairs. A third species, a foot or so in height, is inclined to be woody, the flowers rather larger than in the first two species. A fourth species grows in "vley" ground, *i. e.* ground which is marshy during the rainy season; the colours of this species are vivid, and range from yellow to a deep Tangerine orange tint.—*Combretum Oatesii*. A low-growing procumbent species whose branches radiate out upon the veldt; its deep cherry-red flowers at this season, and its no less gaily-coloured fruits later on, make it very conspicuous. There are many other Combretums, some shrubby, others arborescent.

Wormskioldia Petersiana. The flowers of a pure red, outvieing the red of the pimpernel. — *Hibiscus*. A small herbaceous species with flowers of a deep red colour.—*Melhania*. A small herbaceous species, in great abundance, the flowers yellow.—*Ipomœa* sp. Many Ipomœas appear later on; but this early species springs in tufted branches from close to the ground. The flowers are blue-purple, and nearly as large as those of the greater Bindweed.—*Tryphostemma Mastersii* is very abundant. A quaint plant with its greenish yellow flowers and bladder-like fruit, A large number of papilionaceous Leguminosæ, purple and yellow being the colours mostly seen.—*Trichodesma*. Two species were noted; one darker, both in the flower and in the leaf, than the other. The flowers fade with great rapidity. — *Thunbergia lancifolia* T. And., about 1½ ft. in height, forming a dense green cluster amidst which the beautiful dark blue flowers are partly hidden.

Among the Monocotyledons, the early members noted were a Gladiolus, bright salmon-pink in colour, and *Brunsvigia*, the flowers of dull red colour, the yellow anthers standing out conspicuously. The ridges upon the ovaries, which later develop into wind-vanes to aid the dispersal of the globular mass of fruits (see Journ. Bot. 1898, 142), are only faintly indicated. The flowers open as soon as the end of the scape issues from the bulb; the stalk then rapidly lengthens. The leaves appear later.

Several species of Aloe were noted in rocky situations, from 3 to 4 ft. in height.

Several terrestrial Orchids were noted, among them a new

Holothrix, of which a description by Dr. Rendle is appended to these notes. The flowers of the bulbous plants are most plentiful later in the season.

Amongst trees a *Dombeya* is striking, recalling a cherry-tree in blossom at distant view. *Erythrina* also claims notice. It is usual to find it about the sites of old native kraals. In youth its stem and branches are very spiny, but these are worn down in mature growth and in age; in this regard, perhaps, political analogies are not wanting.

My journeyings around Salisbury were mostly upon foot; the distant ones were made upon the bicycle, usually to lower levels, down the valleys of the Hanyani and Mazoe rivers. After descending 1500 ft. or so, one sees palms of 20 ft. in height. With a little practice one can cycle over the Kaffir footpaths. Two very light boards of three-ply veneer made a little larger than the sheets of botanical drying paper, strengthened by cross-pieces at the back, and drilled through with sundry auger-holes, do not incommode much when strapped upon the back. A heavy revolver is more of a burden, and is a necessity, for not infrequently some very sharp and distinct footprint of lion serves as reminder that the collector may himself be collected.

It is quite remarkable how many plants, belonging to widely different natural orders, come into blossom before the leaves appear.

A few like *Aptosimum* and *Blepharis* flower nearly the whole year through, but in general there is a hastening to get the work of flowering and fruiting over. A plant that is quite plentiful may thus be easily missed, so far as the collection of satisfactory botanical material is concerned.—The terrestrial Orchids are cases in point. I am inclined to think that some of these rest over a season.

Calm days are rarities in Rhodesia. Yet, windy as it is, few flowers appear to be fitted for fertilization by the wind. As regards fruits and seeds it is otherwise, a very large proportion of them being adapted for dispersal by the wind. Wind-pressure is so constant a factor that one would suppose it must influence the plant-structure of the country to some extent. *Euphorbia abyssinica*, which grows in the most exposed places, and has but slender hold upon the thin soil upon and among granite boulders, could not stand against the wind were it provided with leaves. As one watches the beautifully delicate pinnate leaf of the acacia yielding lightly to the wind, the thought comes that this may have been evolved from some simpler form which offered more resistance. Certainly the pinnate type of leaf is very often met with in Rhodesia.

Frequent mention has been made of the fires which ravage the veldt. The gourd family are well protected, for the merely superficial roasting that the gourds get does no damage to the seeds within. Again, the yellow, tough-rinded, ball-like fruit of *Solanum* does not suffer; indeed, it becomes the more conspicuous against the charred background of the surrounding veldt.

The ripe legumes of *Brachystegia* are borne in rather a curious and conspicuous way, being held aloft slightly above the general contour of the tree's leaf-outline. The tree was just coming into

flower again at the end of September. The flowers are sweet-scented. At certain seasons much astringent gum exudes from the trunk and branches. Individual trees standing well apart from others sometimes attain a large size.

In former notes I have referred to *Pretrea*, which is very widely distributed. Its fruits are the despair of cyclists, for no more effective tyre-puncturer could very well be devised. I found these fruits in great quantities in the deep sand round about the post-stations where the mules for the coach service are stabled. Evidently the mules bring them in from the veldt around, and manage to free themselves from the incubus by rubbing their feet in the sand. I travelled between Bulawayo and Tati early in October. The railway passes, for much of the way, through forest of moderate density. Most of the trees were bare, and the ground parched-looking. The association of this wintry look with the burning sun that tyrannizes at midday astonishes when seen for the first time.

In going over one's dried specimens, one realizes how inadequately they represent the plant in life. There must be many contrivances to ensure fertilization yet to be worked out among these African plants; in the *Asclepiadaceæ*, e.g., which are well represented in Rhodesia. The subject of packing is not without interest to the traveller, and certainly one of the marvels of packing in the vegetable kingdom is the disposition of the seeds with their silky appendages in the capsules of many of the *Asclepiadaceæ*. The apparent disproportion as to bulk between the seeds as they emerge from the ripe capsule and the space within which they were confined reminds one of a conjuror's box.

The thorns in many species of Acacia are fistulous; some are very terrible, approaching in size to a meat-skewer. They bulge at about the junction of the lower third with the middle third of their length, much as the scape of the onion does. These formidable thorns would appear to be associated with the extreme delicacy of the leaves of the Acacia.

Myrothamnus is doubtless abundant enough, but I have only noticed it at Fort Gibbs, in Matabeleland. There it was plentiful in the shallow soil, lying in the hollows of the exposed granite. I found many female individuals; males were rare. I found *Canna indica* growing in a spot where it was not likely to have been introduced.

The Mopani (*Copaifera*) is very abundant. The wood is prized for mining purposes, as weevils and termites do not touch it. The crushed leaves have a terebinthous smell. The gum exudes naturally, and should prove a useful Rhodesian export. This tree grows in some localities almost to the exclusion of others. Its bilobed leaves make a mournful sighing in the wind, but it is scarcely correct to describe the tree as affording no shade.

There are several species of *Ficus;* they deserve attention as possible sources of rubber. I noticed one species with abundant latex; this had bled from the upper shoots upon the leaves below, staining them white. The first impression I got upon seeing this particular species was that some colony of birds had made it

their home. One can usually identify the fig-trees from some distance, their foliage being of a rich dark green. They afford excellent shade, and are often to be found among the granite kopjes so common all over the country.

Round about Bulawayo acacias are common; the pods differ very much in the different species; in many the pods tend to hang in drooping clusters. The pink and yellow tassels shown by one species in flowering are very beautiful. The pink colour rapidly fades, even upon the tree, and dried specimens do not in the least indicate the natural beauty.

There are several species of *Protea*. I am inclined to think that after fertilization the involucre contracts upon the fruits until the seeds mature, expanding again later on to set the ripe seeds free. The veldt fires would seem to hasten this secondary opening, as the seeds may be noticed being blown about in great abundance after a fire.

In vley ground, plants tend to form cushiony tufts, even when in other places the habit may be tree-like. Of such, *Eugenia* is an example.

I have again to express my thanks to the botanical staff of the British Museum, and also to Mr. Spencer Moore, for much valuable aid.

The following is the description of the new *Holothrix* referred to above:—

Holothrix Randii Rendle, sp. n. Planta vix pedalis; foliis . .; scapo basi puberula excepta glabro, cum squamis brevibus ovato-acuminatis suffulto; racemo spirali, floribus 11–12, candidis, decoris; bracteis pedicellos breves vix superantibus; ovario glabro; sepalis ovatis, lateralibus asymmetricis, apiculatis, basi cordatis, sepalum dorsale subobtusum parvo superantibus; petalis patentibus, obcuneatis, inæqualiter longe-fimbriatis, labello simili at majore cum basi subventricosa et calcare brevi recurvato.

Plants 26–30 cm. high, scape 3 mm. thick at the base; scales thinly membranous, 7–5 mm. long, diminishing upwards. Raceme 10–12 cm. long, lower flowers 2·5 cm. long, the upper successively smaller; lower bracts 5 mm., ovary 1 cm. long; lateral sepals 4 mm. long by 2 mm. broad, the dorsal 3·7 mm. long; petals 1·7 cm. long, the lower undivided part 5 by 4 mm., segments filiform (10–11), undivided part of lip 7–8 mm. by 7 mm., segments (15) reaching 1·7 cm.; column scarcely 3 mm. long, auricles large prominent; spur when straightened 6–7 mm. long, In a smaller flower the petals were 1·5–1·6 cm. long, with entire portion 3–4 mm., and the lip 1·5 cm., with entire portion 7 mm. long.

Hab. In shady woods; only two specimens found. Salisbury, Rhodesia; Sept. 1898. No. 596. "Flowers pure white, of great beauty and delicacy."

Near *H. longiflora* Rolfe, but distinguished by its glabrous scape and flowers, shorter petals, and longer spur.

CRITICAL NOTES ON SOME SPECIES OF *CERASTIUM*.

By Frederic N. Williams, F.L.S.

(Continued from p. 124.)

57. C. cæspitosum Gilib. Fl. Lithuanica, ii. 159 (1782), et Exercit. Phytol. i. 299 (1792) = *C. triviale* (lusus hirsutus). The description fits this species rather than *C. glomeratum*, as given in *Index Kewensis*. By Gürke, *Pl. Europææ*, ii. 222 (1899), revived in place of *C. triviale*.

58. C. cæspitosum Kit. ap. Kan. in *Linnæa*, xxxii. 524 (1863). A name given by Kitaibel to some Hungarian specimens, to which he applied the meagre note, "*Cerastio Szalaberensi* simile, sed petalis calyce longioribus diversum," which scarcely suffices to establish a species. The specimens were collected at Nagy Szöllös, in the county of Ugocsa, and at Nagy Varad, in the county of Bihar. Reichenbach seems to have examined specimens, and referred them to *C. laricifolium*, citing the unpublished name attached to the specimens as a synonym (*Fl. Germ. excurs.* 799 [1832]). This determination is probably correct, and Kitaibel's plant may therefore be reduced to *C. arvense* var. *laricifolium* Car. et St. Lag. Étude des Fleurs, 129 (1878).

59. C. cæspitosum Malmgr. in Vet. Akad. Oefvers. 1862, 242. A reference to the work cited shows that Malmgren describes this plant only as a var. of *C. alpinum*.

60. C. cæspitosum Schur in Verh. Siebenb. Ver. ii. 177 (1857); et in Oesterr. Bot. Zeitschr. viii. 22 (1858) = *C. Carinthiacum* (Transylvanian specimens).

61. C. cæspitosum Tr. & Planch. in Ann. Sc. Nat. ser. 4, xvii. 152 (1862). Closely allied to *C. alpinum*, but more distinct from it than the preceding.

Hab. Colombia and Ecuador. M. Wagner's specimens were collected at the top of Mt. Pichincha, in the Andes of Ecuador, 4600 metres, a greater elevation than that recorded for any other species of *Cerastium*.

62. C. campanulatum Viv. *Annales Botanici*, i. pt. 2, 171 (1804). The same author's *C. ligusticum* (*Elenchus Plantarum Hort. Botanici*, J. C. Dinegro, p. 15 (1802)), which is not distinguishable from *C. campanulatum*, has never been taken up in floras. There is a note by J. Gay, attached to authentic specimens, that in the original publication of this part the title-page is dated 1802, but this is not the case. There seems, however, no occasion to displace this well-established name.* The type-specimens are in Herb. Mus. Florent. There are no type-specimens of *C. ligusticum*.

Geogr. Range. Italian Peninsula, Sicily, Sardinia, Dalmatia, Herzegovina, Montenegro, Greece (*Haussknecht*, 1885, and Balearic Isles (*Murès*, 1855). Included by Boissier in *Fl. Orientalis*, with the reservation, "dubia civis ditionis nostræ." Its admission to

* [We cannot concur with Mr. Williams in this opinion.—Ed. Journ. Bot.]

the Turkish flora is on the authority of Grisebach (*Spicil. fl. Rumel. Bithyn.* i. 209), who, however, states that the petals in the Balkan specimens are ciliate. If this is so, the specimens cannot be *C. campanulatum*, but almost certainly belong to *C. petricola* Pancic, a species found on Mt. Rilo, on the Bulgarian side of the Balkans. The specimens so named from the Azores belong to an endemic species, *C. Azoricum*.

63. C. CANESCENS Hornem. in Herb. Balbis, ex DC. Prodr. i. 416 (1824) : = *C. brachypetalum* Desp. In referring the specimens to *C. brachypetalum*, Seringe notes a slight variation, "caulis foliaque pilosissima." Royle's specimens under this name, collected in Kashmir, belong to *C. triviale*.

64. C. CAPENSE Sond. in Harv. et Sond. Fl. Capensis, i. 131 (1859). An annual species with the habit of *C. triviale*. In an average capsule I found twenty-seven seeds. The type-specimens of this species are Ecklon & Zeyher, n. 265 (*C. semidecandrum*), n. 266 (*C. pentandrum*), and n. 267 (*C. vulgatum*). Quite different from any other South African species.

Hab. Cape Colony : sandy places below Table Mountain and at the summit, in the Cape District ; nr. Caledon Baths, in the Caledon District ; R. Zwartkops and Addo, in Uitenhage District ; on the Bosch-berg, in Cradock District (*MacOwan*, Pl. austro-afr. n. 238) ; Bosch-kloof, in Clanwilliam District (*Schlechter*, Pl. austro-afr. 1896, n. 8471).

Var. TRANSVAALENSE Williams. Caules 22–23 centim. Folia inferiora lanceolata basi longe petiolato-attenuata, superiora lanceolato-linearia sessilia. Bracteæ foliis similes. Petala oblonga bidentata.

Hab. Transvaal Republic : Pilgrim's Rest, in the mountainous Lydenberg District (*Rev. W. Greenstock*, 1879).

65. C. CARDIOPETALUM Naud. in C. Gay, Fl. Chilena, i. 274 (1845) : = *C. Commersonianum* Ser. So named from the obcordate petals.

66. C. CARINTHIACUM Vest, in Botan. Zeitung, vi. 120 (1807). An earlier name for *C. ovatum* Hoppe (1809), which it supersedes. It has been attempted to distinguish these as two species. The differences, however, "on paper" are very slight, and in the plants themselves do not exist at all.

67. C. CARNOSULUM Turcz. ex Ledeb. Fl. Rossica, i. 413 (1842) : = *C. arvense* var. *ambiguum* Williams.

68. C. CARPETANUM Lomax in Journ. Bot. 1893, 331. The nervation of the ripe capsule places this Spanish species near *C. ruderale*.

69. C. CASTRATUM Kittel, Taschb. fl. Deutschl. 1074 (1837) : = *C. glomeratum* var. *castratum* Wohlfarth in Koch, Syn. fl. Germ. (ed. 3), 308 (1892). Stamina fertilia 5.

Hab. Prussia : nr. Himmelpfort, in prov. of Brandenburg (not to be confused with Himmelpforten, in Hanover).

70. C. Caucasicum Fisch. ex Ser. in DC. Prodr. i. 414 (1824): = *C. nemorale* var. *glabrescens* Ledeb. Fl. Rossica, i. 400. The original brief description is, "caule erecto dichotomo, ramis elongatis, foliis caulinis lanceolatis glabris margine scabris, petalis longitudine calycis glabri, capsulis pedicello pubescente breviori-bus." In habit this glabrescent variety is less branched, and the stems less distinctly furrowed.

71. C. Chassium Form. in Verhandl. Naturf. Ver. Brünn, xxxv. (1896).

Hab. Greece: Mt. Cuka, in the Chassia Mountains. The specimens I examined were not very different from *C. pumilum*.

72. C. Chilense Bartl. in Presl, Reliq. Haenk. ii. 17 (1830): = *C. arvense* var. *Chilenum* Williams. Rohrbach (in *Linnæa*, xxxvii. 304) would consider this a form of typical *C. arvense*, differing only in the larger flowers, and in the calyx 8 mm. long. Mr. E. C. Reed's specimens from Valle del Jeso (1873), in which the hairs are distinctly adpressed or reflexed, may properly be referred to this variety. "Chilenum" is a more correct Latin form of Chilean than "Chilense."

C. arvense var. *Chilenum*. Caules pilis reflexis deorsum fere adpressis vestiti. Bracteæ oblongæ. Flores majores; calyx 8 mm. longus; sepala interiora margine membranacea.

73. C. chloræfolium Fisch. et Mey. Ind. Sem. Hort. Petropolit. iv. 34 (23 December, 1837); Boiss. Fl. Orient. i. 719. A glabrous annual, like *C. perfoliatum*, from which it differs in the divaricate flowers, with large petals ciliate at the base, and 10-nerved capsule.

Hab. Asiatic Turkey: between Hamanli and Safranbol, in prov. of Anatolia; at Ispir, in prov. of Erzeroum.

74. C. ciliatum Turcz. in Bull. Soc. Nat. Mosc. 1838, 89 (nomen); Ledeb. Fl. Rossica, i. 410 (1842) (nomen sub syn. *C. vulgati*); Turcz. in Bull. Soc. Nat. Mosc. 1842, 616: = *C. triviale* var. *ciliatum* Williams.—Læte virens. Turiones elongati, cauliculi sæpe inferne florigero-virgato-ramosi, unifariam hirsuti. Folia lineari-oblonga oblonga vel ovato-oblonga. Cyma subtrichotoma, dichasio 3–10-floro; bracteæ apice late scariosæ. Calyx plerumque purpurascens. Petala biloba infra medium reverse ciliata, calyce subduplo longiora, lobis rotundatis sepalis æquilatis. Capsula calyce duplo longior. Semina exigue striato-tuberculata, margine lævia.

Hab. Siberia: banks and islands of R. Koksun, in the Altaï region, and gravelly places on banks of R. Snicznaja, in Trans-baïkalia.

The type-specimens are no. 267 of Turczaninow's Baïkal plants.

75. C. ciliatum Waldst. & Kit. Pl. Rar. Hung. iii. 250, t. 225 (1812). This plant represents Croatian specimens of *C. arvense*, which scarcely differ from the type in more than the less hairy surface of the leaves; and this scarcely applies to the cauline leaves. In fact, the plate is an excellent figure of the Linnean species.

76. C. COLLINUM Ledeb. in Hort. Dorpat, ex Del. Sem. 1832 in horto Bonn. coll.; ap. Tausch, in *Flora*, xvi. 122 (1833); et Ledeb. in Herb. Strassburg: = *C. purpurascens* Adams. Cultivated specimens were submitted to De Candolle, who considered that they might be a distinct species. "In hortis botanicis sub nomine *C. collini* Ledeb. et *C. macrocarpi* Steven, sæpe colitur."

77. C. COLLINUM Salisb. Prodr. 300 (1796): = *C. arvense*. The specimens so named, cultivated in Salisbury's garden at Chapel Allerton, were gathered on uplands at Wentbridge, in Yorkshire.

78. C. COLSMANNI Lehm. in Spreng. Syst. Veg. ii. 418 (1826). Chilean specimens of *C. arvense*.

79. C. COLUMNÆ Tenore, Prodr. fl. Napol. i. xxvii. (1811), et Fl. Napol. iv. 235 (1830): = *C. tomentosum* var. *Columnæ* Tenore, Syll. Pl. Neap. 221 (1831). This is the plant figured and described as "Ocymoides Lychnitis, reptante radice" in Fabius Columna's *Phytobasanos*, p. 20 (Naples, 1592).

80. C. COMATUM Desv. Journ. Bot. iii. 228 (1814): = *C. Illyricum* var. *androsaceum* Williams. I did not venture to give a varietal name to *C. androsaceum* Ser. (see no. 20 of these notes), before considering the claims of other plants which may be reduced to *C. Illyricum*. The type-specimens of *C. comatum* are in Herb. Mus. Paris., and are without doubt identical with the Turkish specimens labelled "Cerastium pilosum" which Castagne sent to Seringe. The former were from Calvi, in Corsica (cf. Soleirol, *Pl. de Corse*, n. 1007). The name of "C. pilosum" has been applied to so many different plants, that, to avoid needless confusion, it is not desirable to use it as a varietal name. The species now recognized as *C. pilosum* is a Siberian plant. The Kew copy of the volume in which *C. comatum* is described is imperfect, and ends at p. 147; this probably accounts for its omission from the *Index Kewensis*. The Corsican specimens, which may be considered the type of this variety, differ from the normal form of *C. Illyricum* in the following characters:—

Caulis 4–8 centim., ramis rectis brevibus, internodiis plerumque remotis. Dichasium contractum rectum; pedicelli fructiferi calyce sublongiores, nunquam 2–3-plo longiores.

Hab. Corsica, Greece, and near Constantinople.

81. C. COMMERSONIANUM Ser. in DC. Prodr. i. 417 (1824).

Var. DARWINIANUM Williams.—Subglabratum. Folia inferiora 50–70 centim., angustiora quam in typo.

Hab. Coast of Argentina (*Darwin*, 1832, n. 45, in Herb. Kew.).

A species of the habit and facies of *C. semidecandrum*, and among S. American species nearest to *C. triviale* var. *andinum* Williams.

Geogr. Range. Uruguay, nr. Montevideo (*Commerson*); Chile, Rancagua (*Bertero*, "C. cardiopetalum"), Concon (*Poeppig*, "C. macropetalum"); Argentina, Bahia Blanca (*G. C. Claraz*, 1881, n. 111), var. *Darwinianum* (*Darwin*, 1832).

82. C. CONNATUM Beck, Bot. N. & M. States, 55 (1833). In the second edition (1848) of this manual, reduced to *C. triviale* (or perhaps the less common *C. glomeratum* is intended).

83. C. CONNATUM Fisch. in herb. DC., ex Gren. Monogr. 18 (1841) : = *C. pilosum*. With this are also specimens collected by Steven in Siberia.

84. C. CONNATUM S. G. Gmelin, Reise d. Russland, ii. 196 (1774–83) : = *C. davuricum* Fisch. This is the reference queried by Ledebour, and indicated in *Index Kewensis*. I could not find the name in the place cited, and, in the absence of an index, turned over many pages of the volume without succeeding in running it down.

85. C. CONSANGUINEUM Wedd. in Ann. Sc. Nat. ser. 5, i. 296 (1864) : = *C. glomeratum* var. *consanguineum* Williams (*C. viscosum* var. *consanguineum* Rohrb.). Caules pilis brevibus subrecurvis vestiti. Folia anguste lineari-lanceolata. Flores apetali ; sepala apicem versus glabra neque pilis terminata.

First collected in Peru by Weddell ; afterwards in Bolivia by Mandon at 4000 metres.

86. C. CONSTANTINOPOLITANUM Nym. Consp. fl. Eur. 109 (1878). Turkish specimens of *C. glomeratum* in herb. Cosson, collected by Steven near Constantinople.

87. C. CORONENSE Schur, in Verh. Naturf. Ver. Brünn, xv. pt. i. 154 (1877) ; Simk. Enum. fl. Transsilv. 143 (1886) ; Nym. Consp. fl. Eur. suppl. ii. 62 (1889) ; Grecescu, Consp. fl. Romaniei, 119 (1898). The specimens were afterwards referred by Schur to *C. Carinthiacum*, and by Fuss to *C. trigynum*. There are examples authenticated by Schur in Herb. Kew. I have examined these specimens, and they certainly belong to *C. arvense ;* the seeds are not large, angular, and invested with a crumpled testa as in *C. latifolium* and in Parlatore's description of *C. Carinthiacum ;* but the testa is covered with comparatively large tubercles, and closely investing the nucellus. The surface of the leaves is somewhat less hairy than in typical specimens of *C. arvense*, as in Waldstein and Kitaibel's plate of the form they call *C. ciliatum*, but this is the only slight difference.

88. C. CORSICUM Soleir. ex Gren. Monogr. 71 (1841) ; et ex Rouy et Fouc. Fl. de France, iii. 204 (1896) [*C. Corsica*],—Soleir. *Pl. de Corse*, n. 110 : = *C. Thomasii* Tenore. Soleirol's specimens were collected on Mt. Renoso, at 2200 metres, and were described by Seringe as *C. Soleirolii* in Duby, Bot. Gall. i. 87. According to Mr. C. C. Lacaita, they certainly match specimens from the Italian province of Abruzzi (*H. Groves*, 1874) in Herb. Kew., and from Sardinia (*W. Barbey*, 1883). Prof. Ascherson, on the other hand, refers the Sardinian specimens to *C. Gibraltaricum*. If *C. Thomasii* is specifically distinct from *C. arvense*, I certainly think that the Corsican specimens which I have examined should be referred to the former. The viscidulous stem is terminated by one or two flowers, and invested with short crisp hairs.

89. C. CRASSIPES Bartl. in Presl, Reliq. Haenk. ii. 18 (1830). Not mentioned or referred to in Grenier's monograph of the genus, although he describes at length and figures *C. racemosum*, which is described by Bartling on the same page. Rohrbach says "cæspitem

laxum," but the authentic Peruvian specimens I examined were certainly more tufted than in most species of *Cerastium*. A medium-size capsule contained nine ripe seeds.

Hab. Chile, Peru, Bolivia.

90. C. CUSPIDATUM Hemsl. Diagn. Pl. nov. Centr. Amer. 21, et Biol. Centr. Amer. Bot. i. 67 (1879). Closely allied to the preceding and to *C. glutinosum*. From the latter it is distinct in the stems covered with reflexed white hairs, in the membranous pellucid cuspidate leaves, and the shorter less evidently curved capsule.

91. C. DAVURICUM Fisch. ex Spreng. Fl. Halens. app. Pl. min. cogn. Pugill. ii. 65 (1815); Ledeb. Fl. Rossica, i. 401; Boiss. Fl. Orient. i. 717; Hook. f. Fl. Brit. Ind. i. 227. A species of wide distribution. In European Russia found in the province of Astrakhan, on hills near the Volga above Tzaritzyn and Astrakhan; and nr. Slatoust, in the province of Ufa (the northern limit of the species). In Asiatic Russia it is recorded from the Western Caucasus at 2500 metres, the western limit of the species (*C. A. Meyer*, 1830); in the Eastern Caucasus at 2200 metres (*Ruprecht*, 1869); and in Siberia its distribution extends from Lake Balkash eastward to Davuria, beyond Lake Baïkal. In Asiatic Turkey it occurs at Djimil, in the vilayet of Trebizond, at about 2000 metres (*Balansa*); and in N. Persia on Mt. Elbruz (*Buhse*). In the Himalayas the species is recorded from Gilgit, in Dardistan (*Dr. Giles*, 1887), eastward to Kumaon (*Strachey*), the latter specimens marking the south limit of the species. In the Damdar Valley, in Garhwal, Mr. Duthie collected specimens at 3300 metres (1883), and Mr. C. B. Clarke gathered the plant at a lofty station above Alibad, in Kashmir (1876).

92. C. DECALVANS Schloss. et Vukot. Fl. Croatica, 360 (1869): = *C. tomentosum* var. *Mœsiacum* Boiss. Fl. Orient. suppl. 120 (*C. Mœsiacum* Friw.). According to Borbas, this should be kept up as a species, of which *C. Mœsiacum* should be considered a local form. From the series of specimens I examined in Herb. Zürich, I do not think the characters are sufficiently distinct to separate it specifically from *C. tomentosum*. These specimens are distinguished from the normal forms of *C. tomentosum* by the following characters:—Indumentum minus canum; caulis erectus crassior haud vel vix ramosus; folia inferiora late elliptica (20 × 17 mm.), media lanceolato-oblonga (20 × 11 mm.); dichasium pluriflorum; sepala latius scariosa; petala longiora semper calyce duplo longiora. Haussknecht refers the plant to *C. lanigerum*, so also does Gürke.

Hab. Roumania, Bulgaria, Servia, Montenegro, Epirus, Bosnia, Greece, and Albania (for this last, see Baldacci in *N. Giorn. Bot. Ital.* Jan. 1899).

93. C. DENSIFLORUM Guss. Fl. Sic. Prodr. suppl. i. 136 (1832). For the reasons for retaining this name, see *C. aggregatum*. There is an original specimen of *C. densiflorum* in Herb. Kew. authenticated with Gussone's signature (Sicily, 1833). This specimen is 7 centim. in length, and in a medium-size capsule there were eleven seeds. In this, as in other specimens labelled "C. Siculum," the claws of

the petals as well as the filaments are quite glabrous, and unprovided with cilia. Under the lens the rust-coloured seeds show a furrowed depression along the dorsal margin, characters not noted in the published descriptions of the species. These characters serve to separate it from *C. glomeratum*, to which it is united in some floras. Gay has the following note on a specimen labelled "C. aggregatum," from the dept. of Var:—"Cum *C. glomerato* convenit inflorescentiâ glomeratâ, bracteis omnibus herbaceis ex toto, pedicellis fructiferis brevibus, petalorum longitudine et formâ. Differt floribus pentandris non decandris, sepalis apice nudis non barbatis, emarginatis non integerrimis, petalis glaberrimis non basi ciliatis, et capsulâ minus exsertâ, rectâ vel rectiusculâ non incurvâ. Cum *C. pumilo* convenit numero staminum, sepalis apice emarginatis nudisque non barbatis, longitudine pedicellorum fructiferorum et capsulâ rectiusculâ parumque exserta. Differt ramis paniculæ glomeratis, bracteis omnibus herbaceis (quarum superiores in *C. pumilo* apice et margine membranaceæ), petalis brevioribus angustioribus." The stations for Gussone's original specimens are given as "in campis calcareis submontosis inter segetes," in Sicily, at Chiaromonte, Ragusa, and Modica. Tornabene, however, in his recent *Flora Aetnea*, includes the species in *C. vulgatum*.

The species occurs on the south coast of France from Toulon to Hyères, the Iles Sanguinaires off the west coast of Corsica, and in several localities in Sicily. Battandier describes a *C. Siculum* var. *tetrandrum* from Algeria, but the plant seems to me to belong to *C. tetrandrum*. The geographical range of the species is therefore extremely restricted.

94. C. Diazi Phil. in Anal. Univ. Chil. 1862, pt. 2, 391; et in *Linnæa*, xxxiii. 21 (1864–65); Robrb. in *Linnæa*, xxxvii. 308 (1871–72). Insufficiently characterized. Does not seem to differ sufficiently from *C. nervosum*, unless indeed it should be united with *C. pauciflorum* Phil. (= *C. oliganthum* Williams). The specimens collected by Hohenacker at 1100 metres in the Chilean Andes, in *Phil., Pl. Chilen.* no. 130, may possibly be referred to it.

95. C. dichotomum L. Sp. Pl. 438; Gren. Monogr. 44.—This was one of the plants known to Lobel, and described by him under the name of "Alsine corniculata" in *Adv. Stirp. Nov.* 246 (1576). He received the specimens from Clusius, who collected them near Madrid, probably in the same locality from which afterwards Loefling sent specimens to Linnæus, which are the type-specimens preserved in the Linnean Herbarium. The brief diagnosis is—"*Cerastium* foliis lanceolatis, caule dichotomo ramosissimo, capsulis erectis"; and references are given to previous authorities. In Europe the species occurs in Spain, Portugal, and Greece (*Heldreich*, 1884). The geographical limits have been worked out from the specimens examined.

Geogr. Limits. *N.*—Spain; the mountainous district of the province of Galicia, in the neighbourhood of Santiago de Compostella, lat. 43° (*Texidor* in *Revista de los Progresos de las Ciencias*, xviii. no. 899 [1869]). *S.*—British Beluchistan, lat. 30° (*J. H.*

Lace, 1888, ex Journ. Linn. Soc. xxviii. 314 [1891]). *E.*—Affghanistan; Kurrum Valley, long. 70° (*Dr. Aitchison*, 1885, no. 205, et ex Trans. Linn. Soc. ser. 2, iii. 41 [1888]). *W.*—S.W. Morocco; Ida Ouchemlal, and Adrar Mgorn, long. 10° (*Cosson*, 1876, in herb. pro Compend. fl. Atlant. *ined.*). The discovery of the plant by Heldreich at the base of Mt. Pateras, in the nome of Attica, in 1884 (*Herb. Græc. Norm.* no. 829, "Floræ Græcæ civis nova"), is a most interesting extension of the range of the species.

(To be continued.)

THE ALGA-FLORA OF CAMBRIDGESHIRE.

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(Plates 394–396.)

(Continued from p. 116.)

114. C. abbreviatum Racib. in Pamietnik. Akad. Umiej. w Krakowie, Wydz. matem.-prz. x. 1885, 83, t. x. f. 13. A rather small form with a narrower isthmus; long. 12·5 μ; lat. 13·5 μ; lat. isthm. 2 μ. 6. Roswell Pits, Ely.

Several larger forms were also seen with more rounded lateral angles; long. 20–22 μ; lat. 22 μ; lat. isthm. 4·8–5·5 μ. 6. Roswell Pits, Ely. 8. Twenty-foot River, between March and Guyhirne.

115. C. Regnellii Wille, 'Bidrag til Sydamerik. Alg.-fl.,' Bih. till K. Sv. Vet.-Akad. Handl. Bd. 8, no. 18, 1884, 16, t. i. f. 34. The specimens observed approached the variety *madagascariense* West & G. S. West (Trans. Linn. Soc. bot. ser. 2, v. 1895, 58, t. vi. f. 39), but were proportionately longer, and had a very narrow isthmus. Long. 16 μ; lat. 14·5 μ; lat. isthm. 3 μ. 8. Twenty-foot River, between March and Guyhirne.

116. C. impressulum Elfv. 2. Dernford Fen, 1 mile S. of Shelford. 7. Sutton West Fen. 8. Twenty-foot River, between March and Guyhirne.

117. C. læve Rabenh. var. septentrionale Wille. 3. R. Cam at Cambridge. 5. Wicken Fen.

118. C. Meneghinii Bréb. 3. Hardwick. 7. The Washes, Sutton; in ponds, March. 8. Twenty-foot River, between March and Guyhirne.

Forma octangularis Wille. 5. Wicken Fen. 6. Roswell Pits, Ely.

119. C. angulosum Bréb. forma (Pl. 394, fig. 13). 2. Dernford Fen, 1 mile S. of Shelford. 5. Wicken Fen. Long. 14·5–18 μ; lat. 13·5–15 μ; lat. isthm. 3·2–3·8 μ; crass. 7·7 μ. These forms are almost identical in outward form with *C. rectangulare* Grun.

forma Boldt ('Desm. från Grönl.,' Bih. till K. Vet.-Akad. Handl. Bd. 13, Afd. iii. no. 5, 1888, t. i. f. 18), but are of course much smaller. They approach nearly to *C. Elfvingii* Racib. in Pamietnik. Akad. Umiej. w Krakowie, Wydz. matem.-prz. x. 1885, 83 (= *C. hexagonum* Elfv. in Acta Soc. Fauna et Flora Fennica, ii. no. 2, 1881, 12, t. i. f. 8: non *C. hexagonum* Nordst. 1870).

120. C. ANGUSTATUM (Wittr.) Nordst. Syn. *Euastrum binale* (Turp.) Ehrenb. var. *angustatum* Wittr.; *Euastrum polare* Nordst. 5. Chippenham Fen.

121. C. DIFFICILE Lütkem. 5. Chippenham Fen; Wicken Fen.

122. C. EXIGUUM Arch. 5. Chippenham Fen. Long. 14·5–15 μ; lat. 9·5–11·5 μ; lat. isthm. 3 μ.

123. C. SUBSTRIATUM Nordst. 5. Burwell Load; Wicken Fen. 6. Roswell Pits, Ely. 7. Sutton West Fen. 8. Twenty-foot River, between March and Guyhirne.

124. C. TETRAOPHTHALMUM (Kütz.) Menegh. 5. Chippenham Fen; Wicken Fen. 7. Sutton West Fen.

125. C. MARGARITATUM (Lund.) Roy et Biss. Syn. *C. latum* Bréb. var. *margaritatum* Lund. Very large forms: long. 105 μ; lat. 77 μ: lat. isthm. 29 μ. 5. Chippenham Fen, abundant, Aug. 1898.

126. C. MARGARITIFERUM (Turp.) Menegh. 6. Roswell Pits, Ely.

127. C. RENIFORME (Ralfs) Archer. 5. Wicken Fen. 7. Sutton West Fen. Most of the forms from Wicken Fen had the basal angles of the semicells subrectangular, and in this respect they resembled var. *elevatum* West & G. S. West ('Some Desm. of U.S.,' Journ. Linn. Soc. bot. xxxiii. 1898, 307, pl. 17, f. 11). Long. 58 μ; lat. 46 μ; lat. isthm. 14·5 μ.

Var. COMPRESSUM Nordst. in Bot. Notiser, 1887, 159; in Kongl. Sv. Vet.-Akad. Handl. xxii. no. 8, 46, t. 5, f. 5; West & G. S. West, *l. c.* f. 10. Long. 46 μ; lat. 48 μ; lat. isthm. 14 μ. 8. Twenty-foot River, between March and Guyhirne.

128. C. PUNCTULATUM Bréb. 3. Wimpole Park. 5. Wicken Fen. 6. Roswell Pits, Ely. 7. Sutton West Fen. 8. Twenty-foot River, between March and Guyhirne.

*129. C. BECKII Gutw. in *Glasnika zemaljskog Muzeja u Bosni i Hercegovini*, 1896, iii. 376, t. i. f. 7. Long. 29 μ; lat. 25 μ; lat. isthm. 6 μ; crass. 14·5 μ. 8. Guyhirne, in ponds (Pl. 395, fig. 11). This resembles *C. subcostatum* Nordst. (in Wittr. et Nordst. 'Desm. et Œdog. in Ital. et Tyrol.,' Ofv. af K. Vet.-Akad. Förh. 1876, no. 6, 37, t. xii. f. 13) very closely, the semicells being a little more elevated, and the central granules having a slightly different arrangement; there is also but one pyrenoid in each semicell. The outline and the radiating granules agree exactly with the form of *C. subcostatum* figured by Schmidle in Berichte d. Deutschen Bot. Gesellsch. 1892, Bd. x. Heft 4, t. xi. f. 12. Gutwinski's name is unfortunate, as there is a widely distributed species of this genus with the name *C. Bæckii* Wille ('Bidrag til Kundsk. om

Norges Ferskv.-alg.,' Christ. Vidensk. Forh. 1880, no. 11, 28, t. i. f. 10).

130. C. SUBCOSTATUM Nordst. 6. Roswell Pits, Ely.

131. C. COSTATUM Nordst. 'Desm. Arct.,' Ofv. af K. Sv. Vet.-Akad. Förh. 1875, no. 6, 25, t. vii. f. 17. Long. 27–29 μ; lat. 25 μ; lat. isthm. 10·5 μ (Pl. 395, fig. 12). 5. Chippenham Fen. This rare species has up to the present only been recorded for the British Isles from two localities in Scotland, and its occurrence in the fens of the east of England is most unaccountable, being strictly comparable to those cases of *C. anceps*, *C. Holmiense*, &c., already mentioned.

132. C. GREGORII Roy et Biss. 7. The Washes, Sutton, and Sutton West Fen. 8. Twenty-foot River, between March and Guyhirne.

133. C. FORMOSULUM Hoff. 5. Chippenham Fen. 7. Sutton West Fen. 8. Guyhirne.

134. C. QUINARIUM Lund. 6. Roswell Pits, Ely.

135. C. PRÆMORSUM Bréb. 2. Dernford Fen, 1 mile S. of Shelford. 3. R. Cam at Cambridge; Sheep's Green, Cambridge; Wimpole Park. 5. Chippenham Fen; Wicken Fen. 6. Roswell Pits, Ely. 7. Sutton West Fen. 8. Guyhirne.

136. C. BOTRYTIS (Bory) Menegh. 3. Sheep's Green, Cambridge; Trumpington; Wimpole Park. 5. Wicken Fen. 7. The Washes, Sutton; in ponds, March. 8. Twenty-foot River, between March and Guyhirne.

Var. MEDIOLÆVE West. 3. Lord's Bridge.

137. C. TURPINII Bréb. 2. Dernford Fen, 1 mile S. of Shelford. 7. The Washes, Sutton.

138. **C. basilicum,** sp. n. (Pl. 396, fig. 7). C. submagnum, prope 1¼-plo longius quam latius, profunde constrictum, sinu angusto-lineari extremo valde ampliato; semicellulæ subsemicirculares, angulis basalibus subrectangularibus et leviter rotundatis, apicibus levissime depressis; membrana granulata, granulis subsparsis in seriebus subirregulariter ordinatis, medium versus granulis minoribus, ad medium supra isthmum cum seriebus transversis irregularibus tribus granulorum parvorum 5–6, minutissima punctata inter granulos; a vertice visæ ellipticæ polis rotundatis; a latere visæ circulares. Long. 79 μ; lat. 65 μ; lat. isthm. 17 μ; crass. 39 μ.

5. Chippenham Fen: Aug. 1898.

This species may be compared with *C. Kirchneri* Bœrg. ('Bidrag till Bornholms Desm.-Fl.,' Særtryk af Botan. Tidsskrift. Kjobenhavn, Bd. 17, Häfte 3, 1889, 143, t. vi. f. 3) and *C. dentiferum* Corda (cfr. Nordst. 'Desm. från Bornholm,' Vidensk. Meddel. nat. Foren. Kjobenhavn, 1888, 192, t. vi. f. 4, 5), although it differs considerably from either of them. It is of the same outward form as *C. radiosum* Wolle (Desm. U.S. 90, pl. xix. f. 21, 22), but otherwise very different.

139. C. BIRETUM Bréb. 7. The Washes, Sutton, abundant: July, 1898.

140. C. OCHTHODES Nordst. 5. Chippenham Fen. 6. Roswell Pits, Ely. 8. Guyhirne.

Var. SUBCIRCULARE Wille. 3. Wimpole Park.

141. C. SPECIOSUM Lund. 5. Chippenham Fen.

142. STAURASTRUM APICULATUM Bréb. 5. Wicken Fen.

143. **S. paxilliferum,** sp. n. (Pl. 396, fig. 8). S. submediocre, paullo longius quam latius, profunde constrictum, sinu aperto subrectangulo cum apice submammillato; semicellulæ subellipticæ, ventre quam dorso convexiores, angulis subacutis et apiculatis, dorso cum apiculis circ. 6 et ad marginem inferiorem apiculis 2 prope angulos utrobique, apiculis in seriebus sparsis concentricis circa angulos; a vertice visæ triangulares, lateribus subrectis vel leviter convexis, angulis subacutis apiculatisque, cum apiculis parvis sparsis in seriebus transversis circ. 3, in centro glabro. Long. 36·5–40 μ; lat. (cum apic.) 32–38·5 μ; lat. isthm. 12·5–13·5 μ.

5. Wicken Fen: Aug. 1898.

This species I have also observed abundantly from North Yorkshire. It may be compared with *S. brachyacanthum* Nordst. (*Hedwigia*, 1883, 171), from which it is distinguished by its larger size, its much more open sinus and consequently differently shaped semicells, as well as by the somewhat different arrangement of the apiculations. It will also bear comparison with *S. lunatum* Ralfs var. *subarmatum* West (Journ. Roy. Micr. Soc. 1894, 10, pl. ii. f. 47) and with *S. lunatum* forma *alpestris* Schmidle (Oesterr. Botan. Zeitschr. 1895, 24, t. xvi. f. 27), and also *S. tristichum* Elfv. ('Finsk. Desm.,' Acta Soc. pro Fauna et Flora Fennica, ii. no. 2, Helsingfors, 1887, 8, t. i. f. 4) is an allied species.

144. S. AVICULA Bréb. Most of the forms observed were finely granulate, and the spines at the angles were reduced. Long. 34·5 μ; lat. c. spin. 34·5 μ; lat. isthm. 11 μ (Pl. 396, fig. 10). 6. Roswell Pits, Ely.

145. S. ORBICULARE (Ehrenb.) Ralfs var. DEPRESSUM Roy et Biss. 2. Dernford Fen, 1 mile S. of Shelford. 5. Wicken Fen.

146. S. PUNCTULATUM Bréb. 5. Wicken Fen. A form with the lateral angles in the front view slightly produced; long. 31 μ; lat. 31 μ; lat. isthm. 8·5 μ. 2. Dernford Fen, 1 mile S. of Shelford.

147. S. HEXACERUM (Ehrenb.) Wittr. Syn. *S. tricorne* Ralfs. 6. Roswell Pits, Ely.

148. S. INFLEXUM Bréb. 2. Dernford Fen, 1 mile S. of Shelford. 5. Wicken Fen; Chippenham Fen.

149. S. CRENULATUM (Näg.) Arch. 2. Dernford Fen, 1 mile S. of Shelford.

150. HYALOTHECA DISSILIENS (Sm.) Bréb. 5. Wicken Fen; Chippenham Fen.

Order Protococcoideæ.

Fam. Volvocineæ.

151. Gonium pectorale Müller. 3. In ditch, St. John's College "backs," Cambridge; Sheep's Green, Cambridge. 5. Burwell Load.

152. Pandorina morum (Müll.) Bory. 3. Sheep's Green, Cambridge; Hardwick. 6. Roswell Pits, Ely. 7. The Washes, Sutton; ditches and pools about March, in immense quantity: Aug. 1898.

153. Chlamydomonas Pulvisculus (Müll.) Ehrenb. 5. Chippenham Fen. 6. In ponds near Ely. 7. Near March; Sutton West Fen.

154. Hæmatococcus lacustris (Girod.) Rostaf. Syn. *Chlamydococcus pluvialis* (Flot.) A. Br. 5. Wicken Fen. 6. Roswell Pits, Ely.

Fam. Palmellaceæ.

Subfam. Cœnobieæ.

155. Cœlastrum cubicum Näg. 5. Wicken Fen, amongst *Utricularia vulgaris*.

156. C. sphæricum Näg. 3. Wimpole Park. 5. Wicken Fen; Burwell Load. 6. Roswell Pits, Ely. 7. The Washes, Sutton.

*157. C. pulchrum Schmidle (Berichte d. Deutsch. Bot. Gesellsch. Bd. x. 1892, 206, t. xi. f. 1; Ber. d. Nat. Gesellsch. zu Freiburg i. B., Bd. vii. H. 1, 12, t. ii. f. 10). 7. The Washes, Sutton, and Sutton West Fen.

158. Pediastrum Boryanum (Turp.) Menegh. 2. Dernford Fen, 1 mile S. of Shelford. 3. Sheep's Green, Cambridge; Lord's Bridge. 5. Fordham; Wicken Fen. 6. Roswell Pits, Ely. 7. Sutton West Fen. 8. Twenty-foot River, between March and Guyhirne.

Var. granulatum (Kütz.) A. Br. 7. Sutton West Fen.

159. P. constrictum Hass. 5. Wicken Fen. 6. Roswell Pits, Ely.

160. P. duplex Meyen. Syn. *P. pertusum* Kütz. 5. Wicken Fen. 7. Sutton West Fen.

161. P. tetras (Ehrenb.) Ralfs. *Dispositio cellularum* 4:— 6. Roswell Pits, Ely. *Dispositio cellularum* 1 + 7:— 5. Wicken Fen. 6. Ponds about Ely.

162. P. integrum Näg. 7. Sutton West Fen.

163. Crucigenia rectangularis (Näg.) A. Br. 5, Wicken Fen, very fine, 1896 and 1898. 6. Roswell Pits, Ely.

*164. C. quadrata Morren. 5. Chippenham Fen: families of sixteen cells. 7. The Washes, Sutton.

Subfam. Pseudocœnobieæ.

165. Mischococcus confervicola Näg. 3. Sheep's Green, Cambridge: June, 1898.

Subfam. Rhaphidieæ.

166. Dactylococcus infusionum Näg. 6. Sutton.

167. Scenedesmus bijugatus (Turp.) Kütz. Syn. *S. obtusus* Meyen. 2. Dernford Fen, 1 mile S. of Shelford. 3. Hardwick;

Wimpole Park. 5. Wicken Fen. 7. Sutton West Fen; in ponds, March.

168. S. QUADRICORDA (Turp.) Bréb. 2. Shelford. 3. Sheep's Green, Cambridge; Lord's Bridge; Wimpole Park. 5. Wicken Fen; Burwell Load. 8. Guyhirne.

Var. ABUNDANS Kirchn. 3. Sheep's Green, Cambridge; Lord's Bridge. 5. Wicken Fen; Burwell Load. 8. Guyhirne. A granulate form of this species was observed from Dernford Fen, 1 mile S. of Shelford; long. cell. 15–18 μ; lat. cell. 5·7 μ.

169. S. ALTERNANS Reinsch. 5. Chippenham Fen.

170. S. OBLIQUUS (Turp.) Kütz. Syn. *S. acutus* Meyen. 2. Dernford Fen, 1 mile S. of Shelford. 3. R. Cam at Cambridge; Trumpington. 5. Wicken Fen; Burwell Load. 6. Roswell Pits, Ely. 7. The Washes, Sutton, and Sutton West Fen.

171. S. ANTENNATUS Bréb. 5. Wicken Fen, abundant: June, 1895.

172. S. DENTICULATUS Lagerh. var. LINEARIS Hansg. 5. Wicken Fen. 6. Roswell Pits. 8. Guyhirne.

*173. S. ACUTIFORMIS Schröder. 5. Chippenham Fen. 6. Roswell Pits, Ely. The cœnobia observed invariably consisted of four cells, and, seen from the edge view, the terminal cells possessed only three ridges, not four, as figured by Schröder, 'Die Alg. der Versuschst. Schles. Fischer. zu Trachenberg,' Forschungsberichten der Plöner Biol. Stat. Heft 5, 1897, t. i. f. 4*b*. Long. cell. 15·5–21 μ; lat. cell. 5–7·5 μ; long. cœnob. 22–28 μ (Pl. 395, figs. 13–16).

174. RHAPHIDIUM POLYMORPHUM Fresen. var. FALCATUM (Corda) Rabenh. 3. R. Cam at Cambridge; Hardwick; Lord's Bridge. 5. Wicken Fen. 6. Roswell Pits, Ely.

Var. ACICULARE (A. Br.) Rabenh. 2. Dernford Fen, 1 mile S. of Shelford. 3. Sheep's Green, Cambridge; Comberton; Wimpole Park. 5. Burwell Load; Chippenham Fen. 6. Roswell Pits, Ely. 7. Near March; Sutton West Fen.

Some forms were noticed from Sheep's Green, Cambridge, which were distinctly tumid, and had slightly produced, very acute poles; they are comparable to var. *tumidum* West & G. S. West (Journ. Roy. Micr. Soc. 1897, 501, pl. vii. f. 8). Long. 48–63 μ; lat. 4–6·5 μ.

175. R. CONVOLUTUM (Corda) Rabenh. 5. Burwell Load. The cells were only three or four times longer than their diameter, and many of them approached var. *lunare* Kirchn. Diam. cell. 3·5–4·5 μ.

176. TETRAËDRON MINIMUM (A. Br.) Hansg. 2. Dernford Fen, 1 mile S. of Shelford. Many faintly scrobiculate forms were noticed, and these might have been placed as var. *scrobiculatum* Lagerh. in *Notarisia*, 1888, 591.

177. T. TRIGONUM (Näg.) Hansg. 5. Wicken Fen. 6. Roswell Pits, Ely.

*178. T. MUTICUM (A. Br.) Hansg. 6. Sutton. Diam. 15–17 μ; crass. 5 μ.

179. T. TETRAGONUM (Näg.) Hansg. *var. INERME Wille in Bih. till Sv. Vet.-Akad. Handl. Bd. 8, no. 18, 12, t. i. f. 25. Small forms: diam. 13·5–18·5 μ; crass. 9·5 μ. 5. Chippenham Fen.

180. T. CAUDATUM (Corda) Hansg. Syn. *Polyedrium pentagonum* Reinsch. 3. Wimpole Park.

181. T. REGULARE Kütz. Syn. *Polyedrium tetraëdricum* Näg. 5. Chippenham Fen. A very minute form; diam. sine spin. 8 μ, cum spin. 14 μ. 8. Guyhirne.

182. CERASTERIAS LONGISPINA (Perty) Reinsch. Syn. *Polyedrium longispinum* Perty. 3. Ditch, St. John's College "backs," Cambridge.

Subfam. CHARACIEÆ.

*183. CHARACIUM SUBULATUM A. Br. 3. Wimpole Park.

184. C. MINUTUM A. Br. 2. Dernford Fen, 1 mile S. of Shelford.

*185. C. AMBIGUUM Herm. 5. Wicken Fen. 6. Near Ely.

186. C. HETEROMORPHUM Reinsch. Syn. *Hydrianum heteromorphum* Reinsch. 3. Sheep's Green, Cambridge; Hardwick. 5. Wicken Fen.

187. C. LONGIPES Rabenh. 3. Sheep's Green, Cambridge.

188. C. ORNITHOCEPHALUM A. Br. 5. Wicken Fen.

189. C. sp. This large and very stout species possesses oblong-elliptical cells; the apex is acute and minutely apiculate, and the base is shortly stipitate, there being a distinct disc for attachment. The chlorophyll is in numerous parietal cushions of rather small size. Long. 36–46 μ; lat. 11·5–15·5 μ (Pl. 395, fig. 7). 3. Sheep's Green, Cambridge. Also abundant from Keighley Moor, W. Yorkshire.

Subfam. ENDOSPHÆREÆ.

190. CHLOROCHYTRIUM LEMNÆ Cohn. 6. Near Sutton, on *Lemna trisulca*.

Subfam. TETRASPOREÆ.

191. SCHIZOCHLAMYS DELICATULA West. 5. Sheep's Green, Cambridge: June, 1895. 5. Chippenham Fen: Aug. 1898.

192. APIOCYSTIS BRAUNIANA Näg. 2. Dernford Fen, 1 mile S. of Shelford: Aug. 1898, very fine. 3. Hardwick. 5. Wicken Fen. 6. Roswell Pits, Ely.

193. TETRASPORA GELATINOSA (Vauch.) Desv. 1. In the ditch by the Botanical Gardens, Trumpington Road, Cambridge: June, 1897.

Subfam. DICTYOSPHÆRIEÆ.

194. BOTRYOCCUS BRAUNII Kütz. 3. Sheep's Green, Cambridge. 7. The Washes, Sutton, and Sutton West Fen. 8. Twenty-foot River, between March and Guyhirne.

195. INEFFIGIATA NEGLECTA West & G. S. West. 2. Dernford Fen, 1 mile S. of Shelford: Aug. 1898, very abundant. 3. Wimpole Park. 5. Wicken Fen. 6. Roswell Pits, Ely. 7. Ponds S. of March. 8. Twenty-foot River, between March and Guyhirne.

Subfam. Gloeocystideæ.

196. Nephrocytium lunatum West. 2. Dernford Fen, 1 mile S. of Shelford. 6. Roswell Pits, Ely: fairly abundant, Aug. 1895, and July, 1898. *Distrib.*—Westmoreland! Yorkshire! Surrey! N. Ireland! Paraguay.

197. N. Nageli Grun. 5. Chippenham Fen; Wicken Fen. 6. Roswell Pits, Ely. 7. Ponds S. of March.

198. N. obesum West. 5. Chippenham Fen. *Distrib.*—Cumberland! Brazil. Paraguay.

Two forms of this species were noticed in addition to the type. One had somewhat narrower cells with the cell-membrane slightly thickened at the sides; long. cell. 47 μ; lat. cell. 27 μ. The other was a large form with a very thick integument; long. cell. 49 μ; lat. cell. 38 μ; integ. 126 $\mu \times 104$ μ; crass. integ. 10 μ.

199. Oocystis solitaria Wittr. 5. Chippenham Fen; Wicken Fen. 8. Guyhirne, in ponds; Twenty-foot River, between March and Guyhirne.

200. O. parva West & G. S. West, 8. Guyhirne. This species not having yet been figured, I give some illustrations taken from Yorkshire examples (Pl. 394, figs. 14–17).

201. Gloeocystis gigas (Kütz.) Lagerh. Syn. *Chlorococcum gigas* (Kütz.) Grun.; *Glœocystis ampla* (Kütz.) Rabenh. 5. Wicken Fen; Chippenham Fen. 6. Roswell Pits, Ely. 7. Ponds S. of March.

202. G. vesiculosa Näg. 2. Dernford Fen, 1 mile S. of Shelford. 8. Guyhirne, in ditches.

203. G. infusiona (Schrank) West & G. S. West. Syn. *Chlorococcum infusionum* (Schrank) Menegh. 5. In ditches, Burwell Load; Wicken Fen.

204. G. regularis West & G. S. West. Syn. *Chlorococcum regulare* West. 5. Wicken Fen, in peaty pools.

205. Urococcus insignis (Hass.) Kütz. Syn. *Chroococcus macrococcus* Rabenh. 5. Chippenham Fen.

Subfam. Protococcaceæ.

206. Stichococcus bacillaris Näg. 1 and 3. On old wood and damp ground, not uncommon about Cambridge; Orwell, on damp stones and wood.

207. Pleurococcus vulgaris Menegh. Abundant in most localities, and very finely developed on some of the hedges.

208. P. rufescens (Kütz.) Bréb. 1. Very fine on a wet spout, Cambridge: June, 1898.

209. P. nimbatus De Wildem. 2. Dernford Fen, 1 mile S. of Shelford, attached to leaves of *Nuphar luteum*. 5. Wicken Fen, attached to leaves of *Nymphæa alba*.

210. Trochiscia hirta (Reinsch) Hansg. 1. Forming dark green masses on damp ground at the bases of trees, Cambridge, along with *Stichococcus bacillaris* Näg.

211. T. RETICULARIS (Reinsch) Hansg. 5. Chippenham Fen.

212. PROTOCOCCUS VIRIDIS Ag. 3. On stones, Orwell.

Class MYXOPHYCEÆ.

Order HORMOGONEÆ.

Subord. HETEROCYSTEÆ.

Fam. RIVULARIACEÆ.

*213. CALOTHRIX FUSCA (Kütz.) Born. et Flah. in Ann. Sci. Nat. 7e série, Bot. iii. 364 (1886). 3. Sheep's Green, Cambridge; Wimpole Park. In both instances the plants occurred either as solitary filaments or slightly gregarious, attached to *Vaucheria sessilis*. Crass. fil. 7–13 μ; crass. trich. 5–8·5 μ. The heterocysts were basal, single or in pairs, and difficult of observation, owing to a thick, opaque mass of extraneous material usually found agglutinated round the bases of the filaments at their point of attachment. This is the first instance of this alga having been found in Britain, and its occurrence as an epiphyte on *Vaucheria* is rather remarkable, as it is usually found on such algæ as *Batrachospermum*, *Chætophora*, &c., which possess a more gelatinous thallus.

*214. C. EPIPHYTICA West & G. S. West, 'Welw. Afric. Alg.' Journ. Bot. 1897, 240. 8. Guyhirne, on *Vaucheria dichotoma*. Crass. fil. 8 μ; crass. trich. 4 μ. A much smaller species than the preceding, and only previously observed from West Africa.

215. RIVULARIA DURA Roth. 5. Wicken Fen: very abundant in pools and peaty ditches, Aug. 1898. Forming olive- or dark green hemispherical masses of small size, attached to *Myriophyllum spicatum* and *Chara hispida*. Crass. trich. 6·5–10 μ (usque ad 11·5) μ; heterocysts ovate oblong, lat. 5·5–10 μ, long. 6–13·5 μ.

*216. R. MINUTULA (Kütz.) Born. et Flah. 5. Chippenham Fen. This species was attached to the submerged portions of *Phragmites communis*, forming little pulvinate masses of a bright blue-green colour. Crass. vagin. 16–25 μ; crass. trich. 9·5–13·5 μ; heterocysts subglobose or hemispherical, diam. 9–11 μ. Although this interesting species has not been previously recorded for England, it has a wide distribution on the continent, and may probably have been overlooked in this country.

217. GLŒOTRICHIA PISUM (Ag.) Thur. 8. Twenty-foot River, between March and Guyhirne: very scarce, July, 1898.

Fam. SIROSIPHONIACEÆ.

218. STIGONEMA OCELLATUM (Dillw.) Thur. 5. Chippenham Fen, among *Utricularia vulgaris*.

Fam. SCYTONEMACEÆ.

219. TOLYPOTHRIX LANATA (Desv.) Wartm. Syn. *T. coactilis* Kütz.; *T. ægagropila* (Kütz.) Rabenh. 5. Wicken Fen, on the leaves of *Nymphæa alba*. 7. In large quantity in a pond about two miles S. of March. 8. Twenty-foot River, between March and Guyhirne.

220. T. TENUIS Kütz. Syn. *T. pygmæa* Kütz. 5. Chippenham Fen, forming thick, felted, gelatinous masses among *Utricularia vulgaris*.

(To be continued.)

SHORT NOTES.

SCOTTISH RUBI. — The following brambles were collected by me in July, 1898, chiefly in the neighbourhood of Coatbridge, Lanarkshire; the Rev. W. M. Rogers has kindly determined them. Few of these plants seem able to stand the smoke, those most frequently met with being *R. Selmeri* Lindeb., *R. corylifolius* Sm., and *R. danicus* Focke, dwarfed probably by the smoke. Although careful search was made, nothing was seen of *R. rusticanus* Merc. in the parts of Stirling, Lanark, Dumbarton, and N. Ayrshire visited.—*R. fissus* Lindl. Wood by Woodend, Loch Gartcosh, Lanark; new record for v.-c. 77. A plant from Bishop's Wood, Gartcosh, too young for naming with certainty, seems to be *R. plicatus* W. & N.—*R. Rogersii* Linton occurs sparingly in thickets in the King's Park, Stirling; new for v.-c. 86. —*R. hirtifolius* Muell. & Wirtg. var. *danicus* Focke. Abundant in hedges, New Monkland, Lanarkshire; new for v.-c. 77. "A remarkably dwarf form." — *R. corylifolius* Sm. var. *sublustris* Lees. Douglas Support, near Coatbridge; new for v.-c. 77. "A very singular little form." A luxuriant form of *R. corylifolius* grows in hedges near the Bore Stone, Bannockburn.—C. H. WADDELL.

CUMBERLAND PLANTS. — There are a few omissions from Mr. Hodgson's *Flora of Cumberland* that students of *Topographical Botany* would like to see explained. There may be good reasons for their exclusion, but, as the plants have certainly been recorded, it would seem that these reasons should have been stated. *Astragalus glycyphyllos*, *Potentilla verna*, *P. alpestris*, *Statice bahusiensis*, *Epipactis violacea*, are all given as Cumberland plants by Mr. Watson (*l. c.*): I have seen a Cumberland specimen of the *Statice* in Herb. Boswell-Syme. *Rumex domesticus*, with a mark of doubt, is also given for Cumberland in Top. Bot. *Goodyera repens*, another omission, is recorded in the Bot. Record Club Report for 1879, p. 72, from a fir-plantation near the Eden at Armathwaite, "possibly introduced with seedling fir-trees"; the specimen is in the British Museum. The Derwentwater locality for "*Potamogeton lucens*" doubtless belongs to *P. Zizii*, which is not in Mr. Hodgson's book; it was collected there by Mr. C. Bailey in 1882. It is to be regretted that so manifest an error as *P. lanceolatus* should have been entered, in face of Mr. Baker's cautionary note. I note that Mr. Hodgson gives no Cumberland locality for *Lastræa rigida*, although he includes it in his book.—ARTHUR BENNETT.

[From Mr. Watson's MSS. in the National Herbarium it appears that the *Astragalus* and *Potentilla verna* rest on the old localities in the *Botanist's Guide*; for the latter he also gives "Hill between Borro-

dale and Newlands," adding later "*P. alpestris?*," an uncertainty recorded in *Cyb. Brit.* i. 343. *P. alpestris* he records from "Vale of Newlands," and it appears in *Top. Bot.* with a mark of certainty. The *Rumex* stands only on the old authority of Hutchinson's *History of Cumberland*. As we hinted in our review, Mr. Hodgson's painstaking work must be considered rather as an important contribution to our knowledge of Cumberland plants than as a complete history of the botany of the county.—Ed. Journ. Bot.]

Buxbaumia aphylla in Worcestershire. — This rare and interesting moss has been recently found on the Worcestershire side of Wyre Forest by an earnest and very successful moss-student, Mr. J. B. Duncan, of Bewdley, who has a most happy faculty of finding really good things. Mr. E. Clemingham and myself have confirmed this record. The plant was in nice characteristic form, and is, I think, fairly abundant, our station being some few yards from Mr. Duncan's original one. It would be well for the Shropshire botanists to hunt for it on their side of Dowles Brook, as it may extend over a wider area than at present appears. It seems to choose the exposed surface of trees that have been cut down to near the earth's surface and are partly decayed.—J. E. Bagnall.

Terms used to denote Colour. — On reading the remarks on pp. 97–106 on the terms used in botany to denote colour, Mr. C. G. Lloyd, of Cincinnati, was kind enough to send me a copy of Prang's work, entitled *The Prang Standard of Color:* Popular Edition, No. 1. (Boston, Mass.: Louis Prang. [1898]: obl. 4to, pp. 6–7). Had I known this work, I should certainly have included it in my bibliography, for it is the most complete and carefully graduated colour-scheme which has come before me. The seven plates are wonderfully well printed in colour, showing no less than eleven hundred and seventy-six different tints and shades; in the first plate are given twenty-four divisions of the "colour-unit," corresponding as nearly as may be to the spectrum; these are succeeded by the same colours diluted with white, forming tints; the rest of the plates deal with shades—that is, the same colours, but blended with black, each series of oblong patches progressively darkened in the succeeding plates, but forming tints as in the first plate. No printed tints can quite equal the purity of a wash of water-colour, but, that much being granted, the result is excellent, and, if not exposed to strong daylight or the sun, likely to prove fairly permanent. The body colours used in Saccardo's *Chromotaxia* already show signs of deterioration by the reduction of the oxides to their metallic bases. Prang's "Standard" is relatively weak in browns, and perfectly neutral grey is absent; this emphasizes one difficulty felt in the description of natural objects, the extreme wealth of variation in their coloration. A simple method of notation enables the user to identify the colour-patch selected as matching the required tint. Finally, I may note the cheapness of the work, priced, I believe, at fifty cents (= two shillings), the sum which Saccardo's *Chromotaxia* costs in London.—B. Daydon Jackson.

Clasmatacolea cuneifolia Spruce. — I desire to point out an error in the name of a species published in the *Moss Exchange Club Catalogue of Hepaticæ* in 1897. No. 111, *Mylia cuneifolia* (Hook.), should be placed under *Clasmatocolea*, a genus of Spruce's which I had overlooked. This genus was formed to include two South American species, and its place in our list will be between *Laphocolea* and *Chiloscyphus*. Although it has not yet been found in fruit, the British species has been referred to this genus by Spruce. *Acrobolbus Wilsoni* Tayl., recorded by me from Colin Glen, Co. Antrim (Journ. Bot. 1893, p. 118), should be *Jungermania turbinata* Raddi. It occurred through a slip of the pen, as the latter is sometimes called *J. Wilsoniana*. *Acrobolbus Wilsoni* is confined to S.W. Ireland.—C. H. Waddell.

Petiver's Exsiccatæ.—Je vous prierais d'appeler l'attention des botanistes anglais sur ce fait. James Petiver en 1700 ou peu après a publié à Londres :—

1. Hortus siccus chirurgicus . . .
2. Hortus siccus pharmaceuticus . . .
3. Botanicum anglicum, "or the english Herball, wherein is contained a curious collection of real Plants; being the true Patterns of such Trees, Shrubs and Herbs, as are observed to grow wild in England," etc.

Ce sont trois catalogues imprimés d'un seul côté, renfermant de *schedulæ* à couper et à coller sous les *exsiccata*. Chaque *schedula* contient "an account (affixed to each Plant) of their Names, Places where growing, and Times of flourishing; as also, what parts and preparations of each Plant are most use" : et sous cette indication on lit : "Sold by Samuel Smith at the Princes Arms in St. Paul's Church-yard, London."* Je ne crois pas de me tromper en présumant que ces collections d'*exsiccata* étaient vendables. Or, comme dans notre siècle, le coutume de publier et divulguer les collections uniformes de *plantæ siccæ* est devenu habituel et a rendu et rend d'immenses services à la science, il n'est pas sans intérêt de savoir qui a initié ce procédé. Je pense que ce mérite appartient à James Petiver, au moins je ne connais rien de semblable antérieurement à lui; car les *Manifesta* publiés en 1668 par Paul Boccone (cfr. Pritz. Thes. p. 30, n. 858) avaient un autre but. J'espère que les botanistes, et surtout les anglais, voudraient soumettre la question à leur étude et décider si *James Petiver* a été réellement le premier à publier et divulguer des *exsiccata* comme on le fait aujourd'hui.—P. A. Saccardo.

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* On trouve ces trois catal. de Petiver à la fin du IIme vol. de *Jacobi Petiveri Opera Historiam naturalem spectantia*, Lond. 1767 (au moins dans l'exempl. de la Bibl. botanique du Jardin de Padoue).

NOTICES OF BOOKS.

Recherches anatomiques et physiologiques sur le Tradescantia virginica L. Par A. Gravis, Professeur à l'Université de Liège. Bruxelles: Hayez, 1898. 4to, pp. 304, tt. xxvii.

The work before us belongs to a class of which there are too few examples. The author presents us with a strikingly complete structural and morphological monograph (including an admirably thorough account of development from the seed) of a single flowering plant—the well-known *Tradescantia virginica*—to which are added, here and there, interesting physiological observations. Current anatomical literature is mostly made up of comparative observations, more or less thoroughly carried out, on special points; and comprehensive works on single types among the vascular plants are nowadays rarely written, except in the case of isolated plants—mostly Pteridophytes—the details of whose ancestry are expected to throw light on their systematic position. Indeed, we know of only one anatomical monograph on a common plant carried out with anything like the completeness of the work before us, and that is the same author's *Recherches anatomiques sur les organes végétatifs de l'Urtica dioica*, published in 1885. The cause of the scarcity of this type of work lies on the surface. Interest is excited and reputations are made far more easily by conclusions, even of very partial application, based on comparative work, than by painstaking description of the anatomical structure, much of it of course familiar enough, of a single typical flowering plant presenting no very remarkable peculiarities. But the latter kind of work is nevertheless of great importance for more than one reason. In the first place, the investigator of the special point necessarily has to restrict his attention to a very limited field in each plant he examines, and in doing so he often altogether misses relations of structure which would have thrown a flood of light on his problem. We are far too much in the habit of forming a number of isolated pictures of the structure of different parts of a plant, without enquiring as to their connection—and so in attending to the trees we are apt to lose the wood. The state of mind of the average student who is supposed to have had a decent training in anatomy is sufficient evidence of the general tendency, and we have even known experienced botanists who had absolutely no notion of the course of the vascular bundles in the leaf-stalks of some of our common trees, with the structure of whose stems and leaf-blades they were familiar enough. It may perhaps be said that such matters are of little importance from the scientific point of view, but in reality this is by no means the case.

The object of pure descriptive anatomy is to enable us to construct at will a complete mental picture of the structure of plants in all their parts, and in this the connection of the different tissues of one plant is as essential a part as the agreements and differences shown by the same tissue in different plants. We cannot build a secure morphology on descriptive anatomy without both kinds of knowledge. To take a single instance, the phylogeny of the steles

of Pteridophyte stems cannot be understood without reference to that of the vascular strands supplying the leaves, nor can a rational classification of the arrangements of the vascular strands in fern-petioles be arrived at till we know their connection with those of the stem; and yet both these problems have been attacked in ignorance of the necessary complementing data. And in the other science of which descriptive anatomy is a necessary basis—we mean the fascinating and difficult subject of physiological anatomy—the tracing of the different tissue systems throughout the entire plant is even more obviously an essential preliminary. We cannot hope to arrive at trustworthy results without a most minute and accurate knowledge of the distribution of tissues and their elements in the adult plant, and in all stages of growth.

The fabric of our anatomical knowledge has not been built up on systematic lines. After the work of the great founders, Von Mohl, Nägeli, Unger, Sanio, Caspary, Hanstein, Russow, De Bary, Van Tieghem, had placed the subject on a secure base, it has been added to by subsequent workers as fancy or opportunity dictated, and with the most various objects in view. Hence it is not surprising that from a comprehensive point of view the most extraordinary gaps should appear in our anatomical knowledge, gaps which are often scarcely obvious till one takes in hand the task of finding what data do actually exist for settling outstanding general problems.

It is for reasons such as these that we should be especially grateful to workers like M. Gravis, who undertake the somewhat ungrateful task of writing careful anatomical monographs of single plants. They give us the most valuable detailed pictures of the whole of the tissue systems of a given plant in their mutual connections, thus forcing us to attend to relations which we are too apt to ignore, and, in doing so, also help to fill up lacunæ in our scheme of comparative knowledge, and thus furnish fresh data for the future maker of generalizations. However neglected an anatomical point may be, whatever the difficulty of finding reliable information upon it, we can turn to M. Gravis's monographs in the full confidence that it has not been passed over in the plants which he has investigated.

It must not be supposed that M. Gravis confines himself to mere description without reference to the work of other observers. His reading has been exceptionally wide, the bibliography of the present volume containing the names of no less than two hundred and ten works—a sufficiently impressive number even in these days—and each section of his book is full of references to, and critical discussions of, the works of others. In this way, as might be expected, there are very few questions of general anatomical interest on which he fails to touch in the course of his systematic treatment of his subject.

This systematic treatment makes it delightfully easy to find what one wants on any special point, and a quick comprehension of the author's results is still further facilitated by twenty-two pages of careful *résumé*. Finally, we have the author's conclusions on new or disputed points in forty-seven concise paragraphs. The whole work is indeed a model of arrangement.

M. Gravis's description is extremely lucid, and his critical judgment in most cases excellent. A detailed discussion of his results would scarcely be in place in these pages—we need only call attention to one or two points of general anatomical interest. One of the most interesting of M. Gravis's results is in the matter of the anatomical structure of the seedling, a topic of great and, as we think, of increasing importance in morphological anatomy. In the resting embryo there is already a central cylinder sharply marked off from the surrounding tissue in the region of radicle and hypocotyl. The seedling possesses a hypocotyl which, though very short when germination takes place in full light, has a well-marked structure of its own. There is, as usual, a well-defined central cylinder, surrounded by a typical endodermis, directly continuous with that of the root; but the stele is distinctly bilateral about the plane of symmetry of the cotyledon, and exhibits a mixture of, rather than a transition between, the characters of root and stem. It contains five protoxylems, three belonging to three complete collateral endarch bundles which descend from the first epicotyledonary leaf, the remaining two, with centripetally developed xylems, placed right and left of the plane of symmetry, and continuous with the two bundles of the cotyledon petiole. All five xylems, though perfectly distinct in origin, eventually come into contact, forming an irregular xylem mass in the centre of the stele. The three former (first leaf-traces) lose themselves at the base of the hypocotyl in a mass of tracheids, on which the steles of three lateral roots are inserted. The two latter (cotyledon-traces) are continued straight down to form two of the poles of the triarch primary root; the third (anterior) pole, traced upwards, ends blindly at the base of the hypocotyl. The three phloem-strands of the root-stele are continued straight up, and thus form the phloem-strands of the first leaf-traces, while the phloems of the two cotyledon-traces are formed by branches from these.

It is clear that here the general statement of Gérard as to the connection of the vascular strands of root and stem, embodied in Van Tieghem's *Traité* and usually taught as of universal application, does not fairly represent the facts. The symmetry of the root is not completely "determined" by the cotyledon-traces, as in the typical case among dicotyledons, but incompletely by first leaf and cotyledon-traces conjointly. Further, Gérard's account of the passage of the xylem-strands from the centripetal (exarch) arrangement found in the root to the centrifugal (endarch) characteristic of the stem as a "torsion" through 180° is not in this, as indeed it is not in many other cases, a happy or instructive one. Sometimes it applies well enough. For instance, where a xylem-strand of the root-cylinder doubles as it is traced upwards, each half may fairly be said to rotate through 180°, till the protoxylem which was at first directed away from, finally becomes directed towards the centre of the stele; but in others, where no such division takes place, the protoxylem plunges, so to speak, through the xylem-strand, and comes out the other side, while in others again, as in *Tradescantia*, one or more of the root-stele protoxylems are not continued up into

the hypocotyl at all. What happens in the transition from the exarch to the endarch type in the two cotyledon-traces here is not clear from M. Gravis's description or figures, but it is almost certainly not "rotation." The primary fact in all cases is the continuity of some or all of the root-protoxylems with the cotyledon-traces, and sometimes also with those of the first epicotyledonary leaf. This continuity is in direct relation to the first physiological needs of the seedling. The exact distribution of the later-formed xylem about the protoxylem-strand in the different parts of its course is a matter of secondary importance.

Thus in the present case the physiological utility of the primary distribution of the strands is clear enough. The primary root is first placed in direct relation with the cotyledon by the initial differentiation of two continuous protoxylem-strands. This provides for rapid water-supply to the cotyledon in performing its function of first foliage leaf. The first epicotyledonary leaf, on the other hand, developed a little later, is placed in immediate relation with the later-formed absorbing organs, *viz.* the three rootlets, as well as, through lateral contacts, with the xylem of the primary root. Now also phloem channels are developed, connecting all four of the first-formed nutritive organs. We cannot hope to understand different types of tissue arrangement unless we are constantly prepared to consider how far they can be referred in this way to the immediate needs of the organism.

It follows from all this that the phenomena of transition between root and stem are in need of a general restatement in view of the facts already known. We want a thoroughgoing rational treatment of the whole subject of the hypocotyl in immediate connection with the needs of the seedling, in place of the present formal classification into Van Tieghem's three "types." Those types apply well enough to a certain number of cases among the dicotyledons, but even there they only represent a classification of phenomena which appear to be of secondary importance. Whether the treatment suggested would disclose morphological—*i. e.* ancestral—as distinct from physiological "plans of structure," must remain for the present doubtful.

M. Gravis insists that the hypocotyl is the region where the root-strands *join* the foliar strands, declaring that there is no *passage* between them, but that in the course of the hypocotyl the one type is *substituted* for the other type. The data he furnishes do not, however, enable us to decide whether the transition from exarch to endarch orientation in the cotyledon-traces occurs *suddenly*, which is rather what his language would seem to suggest. Such a sudden change is certainly not the rule.

The course of the bundles in the leafy stem is fully worked out, and the accounts of earlier observers corrected in several points, the most important being the demonstration that the so-called "cauline" bundles of earlier observers are in reality the sympodia formed by the bases of the leaf-traces. These are called by M. Gravis "faisceaux anastomotiques" when the system of strands is traced downwards from the leaf into the stem, Lestiboudois' term

"faisceaux réparateurs" being used for the same bundles when the system is traced upwards. The "nodal plexus" is formed in reality by a "réseau gemmaire" giving origin to the bundle system of the axillary branches, a phenomenon which has not been previously described. The type of bundle-course found in the *Commelinaceæ* is shown to be a modification of the general monocotyledonous type.

M. Gravis distinguishes separate "histogens" at the apex of the stem, a distinct periblem with a single layer of initials giving rise to the cortex. He states that the plerome of the stem gives rise to a median layer of leaf-tissue including the veins and an intermediate "median mesophyll." We are sorry that he introduces heavy lines to separate his "histogens." They seize the eye at once, and make it impossible to arrive at a fair conclusion as to whether an author's figures really bear out his conclusions on this point. The point is difficult enough to decide in most cases (frequently indeed impossible), even from the examination of numerous preparations. M. Gravis's work lends no support to Baranetsky's recent surprising conclusions on the differentiation behind the growing point of the monocotyledonous stem.

Of the numerous other points of interest elucidated in this work, such as the aqueous function of the epidermis and hypoderm in the leaf, the function of the subsidiary cells of the stomata, the true nature of the inflorescence, etc., we have no space to speak. We can only again congratulate M. Gravis on having done most admirable service to botany in carrying out his task so comprehensively and effectively. We cannot take leave of his work without noticing the twenty-seven beautifully executed plates by which it is illustrated.

A. G. T.

Histoire de la Pomme de terre, traitée aux points de vue historique, biologique, pathologique, cultural, et utilitaire. Par Ernest Roze. Ouvrage orné de 158 figures explicatives et d'une planche coloriée reproduisant une aquarelle du xvi^e^ siècle. Paris: Rothschild. 1898. Large 8vo, pp. xii, 464. 15 francs.

The author claims for this handsome volume the merit of being the first on the complete history of the Potato; previous notices having been confined to partial views of that esculent, without giving all the documents relating to it. The title is comprehensive, but the author has judiciously restricted his account to the more important and interesting points, as noted below. An attempt to say all that might be said on so important an item of our daily food would obviously need not one volume, but many.

The work is divided into two principal divisions—the first, on the potato from its original home to its introduction into European cultivation, and especially into France; the second, the tuber regarded from its biologic, pathologic, cultural, and utilitarian standpoints. The three chapters devoted to the former division treat of the wild species of *Solanum* which produce tubers, with the views held as to their affinity by systematic botanists, such as Dunal, Alphonse de Candolle, and J. G. Baker. The author considers that the potato as we know it has been subjected to so long a

period of cultivation that it cannot be referred to any one of the wild forms. He narrates the history of its introduction into Europe, beginning with the first mention of the plant by Spanish writers, from Pedro Cieca de Leon, onwards; then its introduction amongst us, giving extracts from the respective writers, translated into French.

It is remarkable that we are still ignorant of the precise method of the introduction of the potato from its home into Europe. M. Roze points out that there were two distinct centres of distribution: (*a*) its cultivation in England by John Gerard in 1596; and (*b*) by Charles de l'Escluse (Clusius) on the Continent in 1588. In connection with Clusius's distribution of the plant, M. Roze gives a coloured facsimile of the drawing which Philippe de Sivry, Prefect of Mons, in Hainault, Belgium, sent to Clusius at Vienna, with two tubers also, which preceded the drawing. The original sketch is preserved in that storehouse of interesting memorials of the end of the sixteenth century, the Musée Plantin at Antwerp, and not long ago was among the drawings exposed to public view in one of the galleries there. It is astonishing how slowly the plant was appreciated, for though Clusius was, according to his wont, generous in distributing to his friends, it was not till towards the close of last century that the cultivation became general in France. Amongst those honourably distinguished in spreading its use, Antoine Augustin Parmentier's name is pre-eminent; he was unwearied in urging its culture, and so identified himself with it as to cause the word "parmentière" to stand as a synonym of "pomme de terre."

The second division of M. Roze's book is concerned with a life-history of the plant; a sketch of the various varieties existing early in the century and at the present time; the diseases to which it is subject, from insects and fungi, including the "curl," the "scab," and the "mildew"; its cultivation and propagation by tubers, and the raising of new varieties by seed, by crossing, and by grafting; harvesting; preservation; utilization; and such details as the preparation of bread, "rice," cheese, starch, spirit, and dextrin from it. The account of the cultivation seems confined to small areas, for there is no hint of the American "spinner," which, drawn by horses, ploughs up the ridge, separates the tubers from the soil, and deposits them in two lines behind the machine, only needing to be picked up; in some patterns the sacks are filled at the same operation.

There are a few slips in the work, as must occur: the names of Cruckshanks, Hemsley, and Gerard are wrongly spelled "Cruckshands," "Hensley," and "Gerarde"; the last, indeed, is natural, for it is misspelled on the title-page (see note in the *Gardeners' Chronicle*, 22 Nov. 1879, pp. 660–1). *Phytophthora* is invariably printed *Phytophtora;* Clusius is claimed as a Frenchman, whereas he died more than half a century before that part of Flanders was taken possession of by Louis XIV. in 1667; other mistakes will be alluded to presently. But these are trifles compared with the bulk of the work, which compresses into one volume a valuable and interesting array of facts.

After all that has been written on the topic, the precise way in which Europe became possessed of the potato is still a mystery; nevertheless there are a few facts worth noting about it. Clusius, to use his latinized and more familiar name, gives this account of his acquisition of the plant, which he calls "Arachidna Theophrasti, forte, Papas Peruanorum," from a false belief that it might be one of the plants described by that Greek writer:—"Primam hujus stirpis cognitionem acceptam fero N. V. Philippo de Sivry Dn. de Walhain et Præfecto urbi Montium in Hannoniâ Belgicæ, qui ejus bina tubera cum fructu, Viennam Austriæ ad me mittebat sub initium anni M.D.XXCVIII. sequente autem anno rami ejus cum flore picturam."

This sketch M. Roze has reproduced, and it bears this note in the handwriting of Clusius: "Taratoufli à Philipp. de Sivry acceptam Viennæ 26 Januarij 1588 Papas Peruãnum Petri Ciecæ." This date was a few months before Clusius quitted Vienna for Frankfort, whither he transferred his belongings and choicest plants; whilst he was there, one of his London friends, James Garret, sent him a drawing of the plant, which statement was misconstrued by Charles Morren into an assertion that Jacob Garet cultivated it at Frankfort. Clusius's own words are: "Mittebat deinde ad me Jacobus Garetus junior, integræ stirpis iconem Francofurtum."

The cuts which are given in the *Rariorum Plantarum Historia* were not from either of these drawings, but were taken from plants in his own possession. To sum up the account of this continental introduction, Clusius had it from Philippe de Sivry, who again had it from one of the retinue of the Papal Legate, whose health was delicate, and it was stated that the use of the plant was extending in Italy, whence the Legate had brought his supply; the Italians most probably received the plant from a Spanish source.

It is more interesting to us to trace, as far as it is traceable, the steps by which the potato came into cultivation in this country. The assertion that Sir Walter Raleigh was the actual introducer is palpably wrong, but the date 1586 is assigned by tradition as the year when our country first received the esculent. Gerard's statement is explicit:—"It groweth naturally in America where it was first discovered, as reporteth *C. Clusius*, since which time I have received rootes hereof from Virginia, otherwise called Norembega, which growe and prosper in my garden, as in their owne native countrie."—*Herball*, p. 781 (with a woodcut, the first published of the plant).

And from this it has been maintained that it must have been from Virginia that our supply came. On the other hand, the potato is not a native of that part of the New World. Raleigh's attempts at colonizing Virginia were disastrous; the second expedition left England in 1585, and came home again with Drake in the following year. Sir Francis Drake had cruised amongst the West Indies during the winter months, harrying the Spaniards, and had taken Carthagena, accepting a heavy ransom for that city; he then sailed to Virginia, and so home. It is possible that some potatoes may have been part of his spoils, for this plant was culti-

vated in New Granada at that period. As Virginia was the last place touched at before reaching England, a confusion as to the actual place of production may very easily have come about, just as the Cape of Good Hope has been credited with plants which are natives of Tropical or Eastern Asia, but brought home by vessels which called at the Cape. The record of Raleigh's second venture was drawn up by Thomas Hariot, as he spells his name on the title-page of his account; but his name was spelled "Haryot," "Heriot," "Herriott," and other variations, to which M. Roze adds the impossible "Hériot." In this little volume, one of the "roots" found edible was that of the "Openauk," which some authors have unjustifiably identified with the potato.

It is quite possible that Gerard obtained his tubers from this expedition, and that James Garret, who was well known to him—"my brother apothecarie," a "curious searcher of simples"—should have sent a sketch of Gerard's plant to Clusius amongst his correspondence. It is probable that Clusius replied to this, as otherwise Gerard's statement "as C. Clusius reporteth" could hardly have been made, the *Herball* appearing at the end of 1597, and the *Historia*, which contains the whole of Clusius's remarks on the plant, not till 1601. Very little is known of James Garret, or Garet, the esteemed correspondent of the Flemish botanist; M. Roze has been misled by the epithet "Belga," applied to him (Hist. i. 177), and supposes him to be a native of Belgium; but "Belga" applies also to the inhabitants of Hants and Wilts, so that Garret probably came from that part, possibly the neighbourhood of Venta Belgarum, the modern Winchester. Garret is mentioned by Clusius in his *Historia* no less than nine times, always in terms of commendation and esteem; had he been a fellow-countryman, he would doubtless have given a strong hint of it.

There remains one point perhaps worth noticing, that of some of the names in common use. Potato is well known to have first designated the Sweet Potato; but the Italian name given by Clusius, "Taratouffli" [= Tartuffoli] became converted into "Tarteuffel" by the Swiss, "Cartoufle," old French, and survives to this day as the German "Kartoffel."

Here we must pause; the volume before us invites ampler discussion, but our space is exhausted. With this introduction to M. Roze's work, we commend it to the attention of our readers.

B. Daydon Jackson.

A Biographical Index of British and Irish Botanists. First Supplement (1893–97). By James Britten, F.L.S., and G. S. Boulger, F.L.S. London: West, Newman & Co. 8vo, pp. 34. Price 1s. 6d. net.

The size of this work bears no proportion to its usefulness, as will be seen when it is stated that it contains more than two hundred —223, to be precise—brief biographies of deceased botanists, including not only those who died in 1893–97, but a considerable number who were accidentally omitted from the original under-

taking. Among the latter will be found collectors like the Forsters, who, though not, strictly speaking, coming within the scope of the work as first defined, were so intimately associated with the progress of botany in this country that their exclusion seemed undesirable.

The list is so familiar to readers of this Journal that any review would be out of place. It may be well, however, to point out that the Supplement contains many additions and corrections which have been made since its serial issue, of which its present form may be regarded as a second and considerably augmented edition. Owing to the small sale of the original *Index*, the number of copies of the *Supplement* is intentionally limited.

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*ARTICLES IN JOURNALS.**

Bot. Centralblatt (Nos. 15–17). — N. Westermeier, 'Züdtungs-Versuche mit Winteroggen.'

Bot. Gazette (18 March), — D. H. Campbell, 'Structure of embryo-sac in *Sparganium* and *Lysichiton*' (1 pl.). — H. C. Cowles, 'Dune Floras of Lake Michigan' (cont.). — R. E. Smith, *Colletotrichum Violæ-tricoloris*, sp. n. — E. J. Hill, *Quercus ellipsoidalis*, sp. n. (2 pl.).—E. Nelson, '*Antennaria*.'

Bot. Notiser (1 April).—N. Bryhn, 'Mosliste fur Norbyknol.'—H. W. Arnell, 'Moss-studier' (*Bryum*).—E. Almquist, 'Biologiska Studier öfver *Geranium bohemicum*.' — A. Nilsson, 'Några drag ur de svenska växtsamhällenas utvecklings historia.'

Bull. de l'Herb. Boissier (25 March). — R. Maire, *Hypomyces Vuilleminianus & H. Thiryanus*, spp. nn. (1 pl.). — G. E. Post & E. Autran, 'Plantæ Postianæ,' fasc. ix.—D. Prain, '*Corydalis persica*' (1 pl.).—B. Fedtschenko, '*Prangos*.'—Id., 'Conifères du Turkestan Russe.' — F. Stephani, 'Species Hepaticarum' (cont.). — G. A. N. Malme, '*Pyxine*.' — G. Schweinfurth, 'Sammlung Arabisch-æthiopischer Pflanzen' (cont.).

Bull. Torrey Bot. Club (12 April). — K. M. Wiegand, 'Revision of *Listera*' (2 pl.).—H. Kraemer, 'Morphology of *Viola*.'—D. Griffiths, *Ampelomyces quisqualis* (1 pl.).—H. H. Rusby, 'S. American Plants' (cont.).

Erythea (1 April). — De Alton Saunders, 'Algæ of Pacific Coast' (*Hapalospongidion*, gen. nov. : 1 pl.).

Gardeners' Chronicle (15 April). — M. Foster, *Iris Tubergeniana*, sp. n. — (22 April). M. T. Masters, *Thamnochortus insignis*, sp. n. (fig. 93).

Journ. Linn. Soc. (xxxiv, no. 236 : 1 April). — R. H. Biffen, 'Biology of *Agaricus velutipes*' (3 pl.). — E. S. Salmon, 'Notes on *Nanomitrium*' (1 pl.).

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

BOOK-NOTES, NEWS, &c.

At a meeting of the Linnean Society of London on March 16th, Dr. John Lowe communicated some observations on the fertilization of *Araujia albens* G. Don, a Brazilian climber, which in the south of England grows in the open air. Last summer it was blooming freely in Lord Ilchester's garden at Abbotsbury, where the flowers were visited by numbers of butterflies, diurnal moths, humble-bees, wasps, and large flies, many of which were captured and imprisoned for a time in the pinching-bodies (*Klemm-körper* of Müller). All these insects, with the exception of some humble-bees, in their visits to the nectar left their proboscis behind, and sometimes a leg, being not strong enough to detach the pinching-body. Dr. Lowe described the structure of the pinching-bodies, which are flat horny plates situated, above the nectar-cups, at each angle of a five-sided hollow cone in the centre of the flower, in which is placed the stigma. There is only a small opening at the apex, and a narrow slit at the base of each facet of the cone. To the upper point of the pinching-body the pollinia are attached. When an insect has its proboscis caught in the slit, which narrows always to its point, it can only escape by tearing away the body with its pollen-masses or by leaving its proboscis in the slit. In the former case it carries the pollinia to the next flower it visits, and thus effects cross-fertilization by leaving the pollen-mass between the anther-wings, whence it rapidly passes into the cone. He had received a number of flowers of *Araujia* from Mr. Benbow, the gardener at Abbotsbury, in some of which he found the proboscis of a butterfly or moth in each of the five angles of the cone, showing the great destruction of insect-life caused by the plant.

At a meeting of the same Society on April 6th, Dr. O. Stapf exhibited specimens of *Stapfia cylindrica*, a freshwater alga discovered by him in a small pond near Hallstatt, Upper Austria, and described by Prof. Chodat, of Geneva, as a new genus of *Tetrasporeæ*. Although not unlike certain species of *Tetraspora* in outward appearance, it differs from them in the perfectly solid gelatinous structure of the thallus. The cells, which exhibit the essential characters of the cells of *Palmelleæ*, are arranged one to three deep in an almost superficial layer on the surface of the colourless matrix; they possess two sheathed cilia each, which penetrate the matrix and extend into the surrounding medium. The only modes of reproduction so far known are by two subsequent divisions, rarely by simultaneous division, into four daughter-cells, the grouping of which into tetrads is, however, soon more or less obliterated, and by the formation of hybernating resting-spores. Prof. Chodat suggested that *Stapfia cylindrica* might be identical with *Tetraspora cylindrica* Kütz., which in that case would have to be quoted as a synonym; but Dr. Stapf gave reasons for not sharing this view. This antedates Mr. J. B. Davy's recently published *Stapfia*, for which he proposes to substitute *Neostapfia*.

At the same meeting, Mr. C. B. Clarke read a paper on *Carex Wahlenbergiana* Boott, of which he exhibited the type-specimens figured in the *Illustrations of the Genus Carex* (vol. ii. 1860, p. 101, pls. 301–305). He showed that the plants figured by Boott on these plates (figs. α, β, γ, δ & ε) were not all referable to the same species. He considered that the name *Wahlenbergiana* should be restricted to the plant α, from which β and γ (regarded as identical) differed by having the spikes more clustered and the utricles conspicuously hairy, and for this form, from Bourbon, he proposed the name *C. Wahlenbergiana*, β & γ, *pilosus* Boott, The variety δ, collected in Abyssinia at an elevation of 10,000 ft., differed in possessing a long stalked utricle of quite a different shape, and was apparently identical with *Carex Steudneri* Boeck., one of the best marked species of the group. The variety ε (of which the type, having been only lent to Boott, was not now accessible) was procured in Bourbon, and only differed from var. β *pilosus* in its shorter leaves, a character to which he attached no importance. A plant from Madagascar, named *Carex Wahlenbergiana* by Boott at a date subsequent to the publication of the plates referred to, bore no obvious resemblance to *C. Wahlenbergiana* even in external aspect; and, having regard to the deeply-stained utricle, Mr. Clarke proposed to name this *Carex hæmatosaccus*, sp. n., although it was perhaps hardly separable specifically from *Carex Renschiana* Boeck., also from Madagascar. The specimens from Fernando Po, collected at an elevation of about 8000 ft., and inscribed *Carex Wahlenbergiana* by Boott's own hand, Mr. Clarke proposed to distinguish as *Carex chlorosaccus*, sp. n., from the green utricle.

In asserting that the three species, *Carex Steudneri* of Abyssinia, *C. hæmatosaccus* of Madagascar, and *C. chlorosaccus* of Fernando Po, had no external resemblance to *C. Wahlenbergiana* (with its var. β *pilosa*), Mr. Clarke admitted that they all belonged to the section *Indicæ*, and were allied; but he maintained that if they were regarded as one species, there were at least twenty Indian admitted species of *Carex* (besides others from Africa) that should be conspecific with it. The difference even between *Carex Wahlenbergiana* var. α and var. β *pilosus* appeared to him greater than the differences existing between many admitted species of the section *Indicæ*.

The little volume on *The Principles of Agriculture*, which Prof. L. H. Bailey has edited for the Macmillan Company of New York (4s. 6d. net), contains a chapter by Mr. B. M. Duggar on "How the Plant lives," which is a model of clear and simple teaching, and other useful essays on pastures, meadows, forage, and the like; but the volume hardly calls for more extended notice in these pages.

The Rev. G. Henslow has published his collection of *Medical Works of the Fourteenth Century*, which we referred to some time since as in preparation. It contains much interesting matter connected with the old names of plants, but, as we have received no copy for review, we are unable to notice it at length.

Herr J. Dörfler, of Vienna, is preparing a new edition of his very useful Botanists' Directory, which will be issued in 1900. He will be glad to receive any corrections of addresses, &c.

Under the title *The Strength and Decay of Nations*, Mr. G. A. Daubeny has published "two essays with notes," dealing respectively with "Forestry" and "British Forestry" (Simpkin, 1s., pp. 48): the former, the author tells us, "was dated Aug. 24th, 1898, before the day of Omdurman and the Fashoda incident." In his concluding paragraph he claims to have shown that "forestry is a subject of the very highest importance" (which most of us knew before), and continues:—"It is worthy the attention of great men; it enables us to read with accuracy the past history of the world; it also enables us to look into the future; it shows how the pillars of the earth have been shaken and thrown down, and how they can and will be rebuilt and re-erected."

Sir John Lubbock contributes to the "International Scientific Series" a volume *On Buds and Stipules* (Kegan Paul & Co., 5s.), which is practically a popular abstract of the papers previously contributed by him to the Journal of the Linnean Society. The author has brought together a vast amount of information bearing upon "the structure of buds, and the diversity and ingenuity of the devices by which plants protect the young and tender tissues from heat, cold, drought, moisture, insects, and other animals"; and has thus furnished proof, if proof be needed, of the scope for observation presented by the most ordinary phenomena of plant life. There is a large series of illustrations, many of them original, others from various sources (duly acknowledged); we think it would have been wiser to have reduced the number of these and to have improved the remainder, as some of those from process-blocks are very poor. The four coloured plates first appeared, we believe, in the Linnean Society's Journal. A useful bibliography and a good index are important features of the book.

Opportunely enough, we read in the *Daily Graphic* (of April 19) of a form of stipule which Sir John does not mention, and to which he will no doubt be glad to have his attention directed. The paper in question figured what it called a "knotted radish," of which Dr. Arthur E. J. Longhurst, of 4 Eaton Square, sent some ingenious "explanations" which seem worth reproduction in their entirety:—

"Sir,—It is difficult to judge of a specimen without seeing it, and though I do not pretend to be an expert in botany, or in the laws which regulate the germination and growth of seeds and plants, as I have not seen any reply to your query as to the 'knotted radish' depicted in your issue of the 10th inst., I venture to offer the following explanations:—

"1. That it may not be a real knot in the root at all, but a bulging of it, due to uneven pressure from a stone or other hard substance in the soil at a given spot above or below the site of the lump, which is a localised enlargement of the root rather than an

actual knot. 2. That if really a knot, it is the result of an irregularity in the germination of the seed, by which the stipule and the root became knotted in the process of development and subsequent growth. 3. It may be the result of either the stipules or the roots of two seeds having grown together at the site of the bulging in the form of a knot, followed by arrest of further normal development, resulting in a monstrosity, as in twin conception in animal life. In any case the specimen is an interesting one, and worthy the notice of the Botanical Society."

Dr. Boerlage has issued the first fascicle (Ranunculaceæ—Polygalaceæ) of what will evidently be a useful new Catalogue of the trees and shrubs cultivated in the Buitenzorg Garden. It contains short diagnoses of several new species and varieties, and of a new genus of Anonaceæ (*Platymitra*). An index makes the part easily consultable, but it is to be regretted that the name of the order under consideration does not appear at the top of each page. We doubt whether, from a bibliographical standpoint, it is correct to cite "Dryand. et Ait." as the authority for the new species published in ed. 2 of the *Hortus Kewensis*.

Mr. C. A. Barber has been appointed Government Botanist in the Madras Presidency. His principal duties will be the prosecution of the systematic botanical survey of the Presidency.

"Appendix III. 1898" of the Kew *Bulletin*, bearing the Stationery Office date "3/99," was issued during April; it contains a "list of the staffs" of Kew and the establishments in correspondence with it. So far as Kew itself is concerned, the list—owing presumably to the period which has elapsed between its compilation and its publication—is inaccurate in many important particulars. The number for December, 1898, has not yet appeared; and nothing has been issued for the present year except "Appendix I. 1899," which appeared in November last. This method of publication may have its advantages, but the general effect is somewhat confusing.

The most recent part (vol. vii., band 1) of the *Denkschriften der Kgl. bot. Gesellschaft in Regensburg* contains the first instalment of an enumeration of Regensburg Mosses by Dr. I. Familler, papers on Willows (including the results of an examination of Koch's types) by Dr. Anton Mayer, an important paper by Dr. H. Poverlein on Bavarian Potentillas, and other systematic and biological papers, relating for the most part to the flora of Regensburg.

The *Gardeners' Chronicle* for April 15 gives a portrait and biography of Mr. Henry Thomas Soppitt, of Halifax, formerly of Bradford, in which latter town he was born on June 21, 1858. The biography, by Mr. C. B. Plowright, contains an account of Mr. Soppitt's considerable work among the fungi, which had been previously commemorated in the genus *Soppittella*. He died at Halifax on April 1.

204 pp. Demy 8vo, Cloth extra, price 6s. 6d. net.

BIOGRAPHICAL INDEX

OF

Deceased British and Irish Botanists

BY

JAMES BRITTEN, K.S.G., F.L.S., & G. S. BOULGER, F.L.S.

"All persons interested in the history of botany and of the botanists of these islands, but more especially those actively engaged in botanical work involving historical research, will welcome a reprint of the 'Biographical Index,' which ran through four volumes of this Journal, beginning in 1888. . . . And this little book is, after all, the foundation, and a good substantial one, too, of the history of British and Irish botanists, which may some day develop into as complete and exhaustive a work as Colmeiro's admirable *La Botánica y los Botánicos de la Peninsula Hispano-Lusitana*. No other nation, I believe, possesses such a work as the latter, and no second nation, so far as I am aware, just such a work as the former."—W. Botting Hemsley in *Journ. Bot.*, Sept. 1893.

"The utility and general accuracy of this compilation were rendered evident in the course of its publication in the *Journal of Botany*, and the favourable impression then received is amply confirmed now that the Index appears revised and completed up to date."—*Athenæum*, Dec. 30, 1893.

"The details given by the authors are very concise, but, considering that they comprise reference to other sources of information, they are adequate. The acquirements of the authors, and the unrivalled facilities at their disposition in the Museum, offer the best guarantees that their work has been well done. Those interested in the history of horticulture, as well as in that of botany, will find the work indispensable."—*Gardeners' Chronicle*, Sept. 9, 1893.

"This book has been compiled to satisfy a felt want among botanists The names, dates, chief facts concerning, and published works of, botanists have been carefully put together."—*The Bookman*, Aug. 1893.

"The authors have done their work well, and made a valuable contribution to botanical literature."—*Natural Science*, Oct. 1893.

THE

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EDITED BY

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SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM (NATURAL HISTORY).

CONTENTS.

PAGE

A New Moss from Afghanistan. By Ernest S. Salmon. Plate 397) 241
Notes on Cambridgeshire Plants. By Arthur Bennett, F.L.S. .. 243
Two Little-known Australian *Myrtaceæ*. By James Britten, F.L.S. 247
Notes on West Surrey Plants. By the Rev. E. S. Marshall, M.A., F.L.S. 249
New Natal Plants. By J. Medley Wood, A.L.S., and M. S. Evans, F.Z.S. Decade III. 251
Middlesex Rubi. By John Benbow, F.L.S. 255
Teodoro Caruel. By Frederic N. Williams, F.L.S. 258
The Alga-Flora of Cambridgeshire. By G. S. West, B.A., A.R.C.S. (continued) 262
Remarks on the *Cybele Hibernica*, Ed. 2. By the Rev. E. S. Marshall, M.A., F.L.S. 269

Short Notes. — Carnarvonshire Mosses.—*Gladiolus oppositiflorus* = *flabellifer*. — *Stachys Betonica* in Donegal. — *Galium sylvestre* Poll. in Surrey.—*Epipactis atrorubens* Schultz. — *Marsea*. — *Dicranum montanum* in Leicestershire.—New and Rare Scottish Hepaticæ.—*Draba muralis* L. in Kent 273

Notices of Books:—
Flora of Kent. By Frederick Janson Hanbury, F.L.S., and Edward Shearburn Marshall, M.A., F.L.S. — The Flora of Cheshire. By the late Lord de Tabley. — The Glasgow Catalogue of Native and Established Plants. By Peter Ewing, F.L.S. 275
Sketch of the Evolution of our Native Fruits. By L. H. Bailey. —Bush Fruits. By F. W. Card 279
Lectures on the Evolution of Plants. By Douglas Houghton Campbell, Ph.D. 281
The Moss Exchange Club: Reports for 1896–8 282
Legré (Ludovic). La Botanique en Provence en XVIe Siècle: Hugues de Solier 283
Phycological Memoirs 284

Articles in Journals 285

Book-Notes, News, &c. 286

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THE JOURNAL OF BOTANY was established in 1863 by Dr. Seemann. In 1872 the editorship was assumed by the late Dr. Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

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West, Newman. imp.

Tenaea media. F. Smith.

A NEW MOSS FROM AFGHANISTAN.

By Ernest S. Salmon.

(Plate 397.)

Tortula (Pterygoneurum) **media**, sp. nov. Autoica, humilis, cæspitosa, terricola. Caulis brevis (2 mill.), simplex vel ramulis fertilibus brevibus di-trichotome ramosus. Folia obovato-oblonga, imbricata, superiora erecta, inferiora patentia, valde concava, margine erecto integro sæpe apicem versus ob parietes transversos prominentes asperulo, nervo basi tenui, supra valido primum folliculoso demum 2–4 lamellas ferente, apice in pilum plus minus longum (interdum obsoletum) exeunte, pilo subdenticulato, hyalino vel inferne rubro-ferrugineo, cellulis lævibus, inferioribus hyalinis rectangularibus laxis (45–70 × 20–25 μ), superioribus chlorophyllosis plus minus quadratis (15–20 μ). Capsula emergens, pro plantula magna, 1 mill. longa, oblonga, gymnostoma, seta erecta crassa capsulæ longitudinem circiter æquante, vaginula brevi appressa integra, operculo oblique rostellato, calyptra cucullata, sporis lævibus 30–38 μ diam. Flos masculus femineo approximatus (ut in *T. subsessili* (Brid.) Mitt., sessilis, foliis perigonialibus enervibus vel subenervibus latis concavis plus minus longe apiculatis, paraphysibus subclavatis.

Patria. Afghanistan (*Dr. Aitchison* (1884–5), no. 183 in Herb. Kew.).

Inter *T. subsessilem* (Brid.) Mitt. et *T. pusillam* (Hedw.) Mitt. ponenda; a priore capsula emergente oblonga nec subglobosa, a posteriore et minutie et floris masculi positione, ab utraque folii cellulis superioribus majoribus differt.

T. media is perhaps most nearly allied, structurally, to *T. pusilla* var. *incana* (Nees & Hornsch.) Braithw. *T. pusilla* var. *Perraldieri* (Besch.) I have not seen. Bescherelle describes his variety as follows (Cat. des Mousses observ. en Algérie, p. 9 (1882)):—"Feuilles très concaves, arrondies au sommet, à marge crénelée-dentée à la naissance du poil denticulé qui déborde assez longuement la feuille; capsule portée sur un pédicelle grêle, qui ne dépasse pas 3 millim., vaginule comprise." From the description this variety seems very near, if indeed it is distinct from, the var. *incana*.

Pottia chottica Trab. appears, from the description and figures given by Trabut (Battandier et Trabut, Atlas de la Flore d'Alger., p. 12, pl. 7, figs. 10–16 (1886); Rev. Bry. 1887, p. 13), to be somewhat intermediate between *Tortula subsessilis* and *T. pusilla*, and must be referred to the genus *Tortula*. It resembles the former in the "capsula immersa obovato-sphærica," but in other respects, as the author says, is "très voisin du *P. cavifolia* [*T. pusilla*], dont il diffère surtout par le poil denticulé qui termine les feuilles, par les feuilles plus étroites, légèrement dentées au sommet."

T. media differs conspicuously from *T. chottica* in habit, the capsule emergent, not overtopped by the perichætial leaves, shape of leaf, &c.

Although *T. media* shows a resemblance to certain forms of *T. pusilla* on the one side, yet, on the other, in the small size, and large, shortly stalked, hardly emergent capsule, it approaches *T. subsessilis*, with which it must certainly be considered congeneric. *T. subsessilis* is often placed by itself in the genus *Pharomitrium*, characterized by the mitræform calyptra. The shape of the calyptra, even if constant, could not be considered a character of sufficient generic value; it is, however, in *T. subsessilis*, liable to variation, as I have found calyptræ distinctly subcucullate, *i. e.* deeply split on one side, and opposite to this, on the other side, only one very short slit. Moreover, *T. media*, and perhaps *T. chottica* also, link *T. subsessilis* to *T. pusilla*, and further prevent *T. subsessilis* being placed in a special genus. It is more difficult to decide if the above species should be included in the genus *Tortula*, or, together, should constitute a separate genus. The latter view has been taken by Juratzka (Laubmoosfl. von Oest.-Ungarn, p. 95 (1882)), who placed *T. subsessilis*, *T. pusilla*, and *T. lamellata* Lindb. in his genus *Pterygoneurum*, and this arrangement has been followed by Limpricht (Die Laubm. i. Abth. p. 520 (1888)).

The three species just mentioned above form, with *T. media* and *T. chottica* (Trabut), a group of five species, all of which show the same peculiar leaf-structure. *T. lamellata*, however, is peristomate, and moreover forms so evident a connecting link with other species of *Tortula*, that it seems, I think, far more natural to regard, as many authors have done, the peculiar structure of the leaf in these species as a character of only secondary generic importance, and to give, therefore, *Pterygoneurum* a sectional or subgeneric rank under *Tortula*. It may be pointed out that if we consider the peculiar leaf-structure of *T. pusilla*, &c., a character of sufficient value for establishing a genus, then we must allow such genera as *Aloina* for *T. aloides*, &c.—species which, except in leaf-structure, are in all respects typical species of *Tortula*.

T. pusilla, as well as *T. media*, occurs in Afghanistan; there are specimens in the Kew Herbarium collected by Dr. Aitchison (1884–5), no. 186, as well as older ones collected by Griffith, "Otipore (Afghan Coll.) 93" [1839]. Afghanistan extends the range of distribution of *T. pusilla*, as Persia has hitherto been recorded as its eastern limit.

Explanation of Plate 397.—Fig. 1. *Tortula* (*Pterygoneurum*) *media*, sp. nov., from Afghanistan (*Dr. Aitchison*, no. 183 in Herb. Kew.), two plants, nat. size. 2. Plant, with two capsules × 12. 3. Leaf × 25. 4. The same, flattened out × 25. 5. Areolation of leaf at one-quarter from the base × 255. 6, 7. Areolation of leaf at one-quarter from the apex × 255. 8. Transverse section of leaf at about one-third from the apex × 68. 9. Part of same × 255. 10. Capsule, showing very short seta and vaginula × 12. 11. Calyptra × 25. 12, 13. Two perigonial leaves × 68. 14. Antheridium and paraphyses × 68.

(Note to Fig. 8.—A slight error appears in this reproduction of the drawing of the nerve-section. The four small cells, shown with shaded walls, in the centre of the nerve are the "Begleitergruppe," and the cell-walls of this group should be represented as very thin and delicate.)

NOTES ON CAMBRIDGESHIRE PLANTS.

By Arthur Bennett, F.L.S.

The interesting notes on Cambridgeshire plants by Mr. W. West, Jun. (Journ. Bot. 1898, 246–259), caused me to look up some of my own notes on that county; in addition to these, I have extracted others from the copy of Babington's *Flora of Cambridgeshire* that belonged to the late Mr. W. Marshall, of Ely, kindly lent me by Mr. W. Cross. A few species gathered by Mr. Fryer are given; these are either of interest as very rare, or supposed to be extinct, or stand for additional districts to the Cambridge Flora. Mr. Fryer possesses a large series of observations, which I hope will some day be printed. Unless otherwise noted, the Chippenham Fen localities are those noted by Mr. Fryer and myself in a visit to the Fen in 1883. The other localities rest on my own authority.

Myosurus minimus L. 7. Chatteris, *A. Fryer*. — *Ranunculus circinatus* Sibth. 5. Burwell Fen, 1883. — *R. Lingua* L. 5. Burwell Fen. — *R. auricomus* L. 6. Ely, hedge on the road to Stretham, April, 1894, *Marshall*.

Aquilegia vulgaris L. 5. Chippenham, *W. Cross*, 1883.

Nymphæa alba L. 5. Burwell Fen; Chippenham Fen.

Diplotaxis muralis DC. 5. Chippenham, 1883; between Wicken and Burwell, by the old footpath; on the bank on this side of Soham Mere, 1869, *Marshall*.— *Alyssum calycinum* L. Waterbeach Station, Fordham, 1894, *Marshall*.

Viola hirta L. 5. Chippenham, *W. Cross*; Wicken Fen, *Marshall*, April, 1896. — *V. stagnina* Kit. 6. West Fen, Ely; Roswell Pits, *Marshall*.

Drosera rotundifolia L. 5. Chippenham Fen, *W. Cross*.— *Parnassia palustris* L. 5. Chippenham Fen, *Marshall*, about 1894; *Fryer & Bennett*, 1883.

Polygala depressa Wender. 5. Chippenham Fen.

Saponaria officinalis L. 5. Fordham, bank opposite cottages!, *W. Cross*, 1883. — *Silene inflata* Sm. 6. This is getting common along the railway sides, brought in by ballast, *Marshall*. — *S. noctiflora* L. 5. Between Wicken and Burwell, by the old footpath. 6. This has become a somewhat common weed in the arable land in the fens, probably introduced with the seed wheat from the high country, *Marshall*. — *S. Otites* Sm. 5. Chippenham Gravel-pit, *Hailstone herb.*, 1843. — *Sagina apetala* L. 1. Gogmagogs, *Baines herb. at York*. — *Malachium aquaticum* Fries. 3. Ditches about Grandchester Mills, Aug. 1839, *Hailstone herb.*

Hypericum perforatum L. 6. Ely Common, near Roswell Hill, *Marshall*.

Geranium pratense L. 6. This used to be in Lower Barton next Potter's Lane, but it is now gone, *Marshall*.

Trifolium ochroleucum Huds. 6. In one field only in Barton, *Marshall*.

Prunus Padus L. 5. Chippenham, *W. Cross*! — *Comarum palustre* L. Wimblington-in-the-Firelots, 4 ft. high, 1884, *A. Fryer*!

—*Geum rivale* L. 5. Fordham, one plant!, *W. Cross*, 1883.—*Rosa villosa* (*mollis*) L. 7. Pringle's Dune, Chatteris, "teste J. G. Baker," *Fryer*.

Myriophyllum verticillatum L. 5. Chippenham Fen.

Ægopodium Podagraria L. 5. Fordham. — *Œnanthe Lachenalii* C. Gmel. 5. Burwell Fen, 1882. — *Œ. silaifolia* Bieb. 7. Sides of Bedford R., Sutton Chain, *Fryer*. — *Œ. fluviatilis* Colem. 5. Ditch by Burwell Fen, 1882. — *Peucedanum palustre* Moench. 6. Roswell Hill of late years (1869); it was not there twenty years ago, *Marshall*.—*Silaus pratensis* Bess. 5. Fordham, 1883.—*Daucus Carota* L. 5. Chippenham Fen. — *Selinum Carvifolia* L. 5. In 1883 Mr. Fryer and I made a careful examination of the locality of this plant, and though we were unable to cut through the raised ground on which it principally grew (to see if it was made ground), the conclusion we came to was that it was not an indigenous species, but probably introduced with the belt of trees; there may be sixty to eighty years of growth. The plant in 1883 was evidently extending itself into the fenny ground around, by plants here and there. Doubtless, in Relhan's time, this fen (or moor) was very much wetter than it is now, hence more difficult of access; but he could not have failed to see the plant when in bloom (if it was there?), and there is no record of *Peucedanum* thence, for which it might have been mistaken; and the Rev. J. Holme, of Snailwell, who gathered *Senecio paludosus* and *Eriophorum latifolium*, would surely have found it. To me, the whole aspect of the plant and its growth is against it being indigenous. Is the Lincolnshire station more likely to be indigenous? Of course, it is quite naturalized and wild at Chippenham.

Viburnum Opulus L. 5. Chippenham.

Valeriana dioica L. 5. Chippenham Fen.

Dipsacus pilosus L. Devil's Ditch, *Miss Jane Hailstone in herb. Hailstone*.—*Scabiosa Succisa* L. 5. Chippenham.

Senecio palustris DC. "West Fen, Ely, *W. M.*," Top. Bot. ed. 2, 1883. This is not correct; I never found it but once, and that in Methwold Fen, Norfolk, *Marshall*. I know of no recent occurrence of this in the county. — *S. paludosa* L. 6. Isle of Ely, 2 sp., *Winch herb. at Linn. Soc*; Littleport; Burwell Fen, quoted in Eng. Bot. t. 650; Barraway Wash (formerly, 1789, Barway), *Marshall*, extinct. 5. Wicken Fen. I have seen many specimens (and possess one), gathered by Rev. J. Holme between about 1820 and 1838 (some earlier?). Since 1857, when it was taken to the Botanic Garden at Cambridge (see Babington's Journal, p. 186), other specimens have been gathered.—*S. sylvaticus* L. 5. Between Soham and Wicken, 1888.—*Artemisia campestris* L. Sare in How's Phyt. Brit.—an error? — *Serratula tinctoria* L. 5. Chippenham Fen.—*Carduus pratensis* Huds. 5. Chippenham Fen.—*C. acaulis* L. 6. Not common at Ely, *Marshall*. — *Sonchus palustris* L. 5. Bottisham Fen, opposite the "Knave of Clubs" ale-house, 1843, *Hailstone herb*. 6. *Burnt Fen, *J. Crowe* in Hudson's Fl. Angl. *l. c.*—

* This is partly in Suffolk and partly in Cambridgeshire, or it may refer to a small fen in Norfolk.

Lactuca Scariola L. 6. I introduced it at Roswell Hill, where it still remains, *Marshall.*

Chlora perfoliata L. 5. Chippenham Fen. 7. Chatteris, *Fryer.* —*Menyanthes trifoliata* L. 5. Chippenham Fen. 6. I detected a small piece of this in Roswell Hill, many years ago, where it still remains; in dyke on washes of river, *Marshall.*—*Gentiana Amarella* L. 5. Chippenham Fen.

Lithospermum officinale L. 5. Chippenham Fen, in 1883. 6. Roswell Pits, Ely, where it has been many years, *Marshall.*—*Myosotis cæspitosa* F. Schultz. 7. Chatteris, *Fryer.*

Linaria spuria Mill. and *L. Elatina* Mill. 5. Chippenham. 6. (*spuria*) Turnip-field between Ely and Downham, G. R. W. B.; *Marshall.* — *Pedicularis palustris* L. 6. Used to grow in Padnal Fen; now extinct, *Marshall.* — *Veronica spicata* L. Mr. West (Journ. Bot. 1898, 255) remarks that he knows "nothing concerning the Top. Bot. (Wardale's) Norfolk record." In the British Museum Herbarium there is a specimen from "Bawsey, near Lynn, Aug. 1845, *B. D. Wardale*," who also sent specimens to the Botanical Society of London.

Salvia Verbenacea L. 6. Used to grow in Spring-head Lane, Ely; now only to be found on the Cherry Hill, *Marshall.*—*Teucrium Scorodonia* L. To Henslow's "Ely! *H.*" Marshall has put "never!" —*T. Scordium* L. 7. Hundred Foot, *Fryer sp.*

Pinguicula vulgaris L. 5. Chippenham, *Marshall.* 1883! *F. & B.*—*Utricularia vulgaris* L. 5. Chippenham Fen; Burwell Fen.—*U. minor* L. 5. Chippenham Fen, *W. Cross*, 1881. *F. & B.*, 1883. —*U. neglecta* Lehm. 5. Probably occurs in Burwell Fen! but the specimens, not being in flower, are not certain.

Anagallis tenella L. 6. Downham West Fen, but I fear gone, *Marshall.*

Statice caspia Willd. 8. Sp. in Herb. Brit. Mus., Sept. 1796, *J. Sowerby.*

Ceratophyllum submersum L. 7. The Gull, Sutton Gault, 1883, *Fryer.*

Myrica Gale L. Wimblington-in-the-Firelots, 1884, *Fryer*!

Daphne Laureola L. 6. Also at the entrance of the village (Witchford) from Ely, years ago, but now gone, *Marshall.*

Euphorbia exigua L. 6. Stutney Field, 1877, *Marshall.*

Hydrocharis Morsus-ranæ L. Isleham, *Fryer.*

Stratiotes Aloides L. 6. Near Stretham Ferry, in old gravel-pits, *Marshall.*

Orchis maculata L. 7. Chatteris, 1883, *Fryer.*—*O. incarnata* L. 5. Chippenham Fen. — *Habenaria viridis* R. Br. 6. Ely; Soham, *Marshall.* — *Gymnadenia conopsea* Brown. 5. Chippenham Fen.—*Ophrys apifera* Huds. 5. Chippenham Fen, plentiful in 1883, *W. Cross.* 6. Appeared in Ely Cemetery, and now abounds there, *Marshall.*—*Epipactis palustris* Crantz. 5. Chippenham Fen, 1883. —*Cephalanthera grandiflora* Bab. "Babraham in 1859! *Mr. Josh. Clarke.*" This is an error; Mr. C. B. Clarke sent me the two specimens gathered, "on the authority of which it was inserted in the Fl. Camb."; they are certainly *Habenaria viridis* R. Br. — *Liparis*

Loeselii Rich. 5. Three specimens in Wicken Fen, 1896, *I. H. Burkill*. As noted by Mr. West, plentiful in this district over a fair extent of ground.

Ornithogalum umbellatum L. 6. Near Ely, *W. Cross*. — *Allium oleraceum* L. The Coton plant was *oleraceum*.

Juncus acutiflorus Ehrh. 7. Doddington, *Fryer*.—*J. obtusiflorus* Ehrh. Chippenham Fen.

Butomus umbellatus L. 5. Between Soham and Wicken, 1888. 6. Ely, *Marshall*.—*Alisma ranunculoides* L. 5. Chippenham Fen; Burwell Fen.

Triglochin palustre L. 5. Chippenham Fen; Wicken Fen.

Sparganium simplex Huds. 5. Chippenham Fen; Burwell Fen.

Potamogeton natans L. 5. Chippenham Fen, *Fryer*. — *P. polygonifolius* Pourr. 5. Burwell Fen, *Relhan*, 1805, *sp. in herb. Dalton at York*. Bottisham Fen, 29.5.1829, *J. Dalton*! The Gamlingay plant was correct; there is a specimen in herb. Watson at Kew.—*P. plantagineus* Du Croz. 5. Burwell and Bottisham Fens, 29.5.1829, *J. Dalton*! 7. Chatteris and Benwick, *Fryer*. — *P. heterophyllus* Schreb. 5. Burwell Fen, 1829, *Dalton herb. l. c.*! 7. Plentiful, *Fryer*.— *P. lanceolatus* Sm. 5. Burwell Fen, 1880. — *P. lucens* L. 5. Burwell Fen. — *P. decipiens* Nolte. 5. Between Burwell and Fordham, 1883. 7. Plentiful, *Fryer*. — *P. prælongus* Wulf. 5. Burwell Fen; between Burwell and Fordham, 1883.—*P. perfoliatus* L. 5. Burwell Fen; Bottisham Fen, 1845, *Hailstone*!—*P. crispus* L. 5. Between Soham and Wicken, 1888.—*P. zosterifolius* Schum. 5. Bottisham Fen, 28.5.1829, *J. Dalton*! — *P. (compressus) Friesii* Rupr. 5. Bottisham Fen, 1829, *J. Dalton*! Between Soham and Wicken, 1888; Burwell Fen, 1881; Mepal, *Fryer*! In the Vienna Herbarium there is a specimen from "Cambridge, *Churchill Babington*."—*P. pusillus* L. 5. Between Wicken and Burwell; Chippenham Fen; Isleham Fen, *Fryer*.—*P. pectinatus* L. 5. Burwell Fen, 1883.—*P. flabellatus* Bab. 5. Burwell Load, 1888.—*P. densus* L. 7. Welch's Dam, *Fryer*.

Cladium Mariscus Brown. 5. Chippenham Fen, 1883. — *Eleocharis acicularis* R. Br. 5. Wicken Fen, plentiful, 1888; Burwell Fen. 7. Chatteris, *Fryer*! — *Scirpus lacustris* L. 5. Chippenham Fen.—*S. Tabernæmontani* Gmel. 7. Welch's Dam, *Fryer*. — *Carex paradoxa* Willd. 5. Wicken Fen, *Fryer*! — *C. prolixa* Fries. 1. Wilbraham Long Dune, 12.5.1848, *W. W. Newbould in herb. Brit. Mus.* — *C. panicea* L. 5. Wicken Fen. — *C. Goodenovii* Gay. 5. Chippenham Fen. — *C. præcox* Jacq. 6. Ely; Barton Meadows, 1894, *G. R. W. B. Marshall*.—*C. flava* L. 5. Chippenham Fen.—*C. distans* L. 5. Chippenham Fen.—*C. filiformis* L. 5. Chippenham Fen.—*C. Pseudo-cyperus* L. 6. Once found this on the Long Wash, near the overfall mill; Ely, by the White Bank side, *Marshall*. —*C. ampullacea* Good. 5. Seen in Relhan's station in 1883; Isleham Fen, *Marshall*.—*C. vesicaria* L. 5. Burwell Fen.

Phleum Boehmeri Schrad. 5. Hedgebank beyond Bottisham, on the road to Newmarket, 1839, *Herb. Hailstone*! — *Calamagrostis lanceolata* Roth. 5. Chippenham Fen. 7. Chatteris, *Fryer*. — *C. epigejos* Roth. 5. Wicken Fen; this species was certainly not

plentiful here in 1880–1888. Ditch, Burwell Fen. 7. Chatteris, *Fryer*.—*Bromus erectus* L. Dullingham, *Herb. Hailstone*.

Tolypella prolifera Leonh. 7. Vermuden's Drain, *Fryer*, 1884! I saw it there with Mr. Fryer in 1886. — *T. glomerata* Leonh. 5. Wicken Fen, 1882; Bottisham Fen, *Messrs. Groves*, 1882.—*T. intricata* Leonh. 4. Harston, 1880. — *Chara tenuissima* Desv. 5. Wicken Fen, by the Lode, very abundant, 1882. Hundreds of specimens might have been gathered.— *C. vulgaris* L. 5. Burwell. 7. Linguard Fen, *Fryer*.—*C. polyacantha* Braun. 5. Wicken Poor's Fen, 1882; Chippenham Fen, 1881, *W. Cross*! A beautiful uncrusted form occurred in 1883 near Chippenham.—*C. hispida* L. 5. Burwell Fen. — *C. aspera* Willd. 5. Burwell Fen, 1881. 7. Vermuden's Drain, *Fryer*, 1883! — *C. fragilis* L. 5. Chippenham Fen, *W. Cross*, 1881! Wicken Fen, 1882; Burwell Fen, 1883.

TWO LITTLE-KNOWN AUSTRALIAN MYRTACEÆ.

By James Britten, F.L.S.

In Gaertner's *De Fructibus et Seminibus Plantarum* (vol. i. 1791) are figured and described two *Myrtaceæ* which have not hitherto been identified with any recent species: even their names, until the *Index Kewensis* again brought them to light, have dropped out of books—neither, for example, is cited in De Candolle's *Prodromus*. In the course of my recent work at the Australian collections of Banks and Solander I have been enabled to dispose of these little-known species, one of which presents features of considerable interest; and I propose to put on record the identifications which have been made.

1. Eugenia paniculata

Banks [& Sol.] ex Gaertn. Fruct. i. 167, t. xxxiii. 1 (1788) et in Herb.! R. Br. MSS.: non Lam. Encycl. iii. 199 (1789).

Syzygium paniculatum Gaertn. *l. c.*

Myrtus paniculata J. F. Gmel. Syst. 792 (1791).

Eugenia myrtifolia Sims, Bot. Mag. t. 2230 (1821); Benth. Fl. Austral. iii. 286 (1866).

The specimens collected by Banks and Solander at Botany Bay in 1770 are identified by Bentham, who does not cite the Banksian name (Fl. Austral. iii. 286), with *E. myrtifolia* of Sims, which is of course of much later date. Brown, in whose MSS. there is a long description of the plant, identified it with specimens collected by himself at Shoalwater Bay and Hunter's River, which are likewise named by Bentham. There is also a brief description in Solander's MSS.

In the *Index Kewensis*, *E. paniculata* Lam. is placed with this, with which, however, it has no affinity, and the locality "Ins. Borbon."

is applied to both: Lamarck's plant was published a year later than Gaertner's.

2. Myrtus nitida

J. F. Gmel. Syst. 792 (1791).

Syzygium lucidum Gaertn. Fruct. i. 167, t. xxxiii. (1788).

Eugenia lucida Banks [& Sol.] ex Gaertn. *l. c.*, et in Herb.! Sol. MSS.

Myrtus monosperma F. Muell. in Victorian Naturalist, ix. 9 (1892).

This interesting and distinct plant seems to have remained unnoticed for more than a hundred years since it was first obtained by Banks and Solander in the same district—Endeavour River—in which it was collected by Mr. W. Persieh about 1891. The Banksian specimens, with Gaertner's names attached to them by Dryander, have remained in the Herbarium at the end of *Eugenia* ever since they were first placed there, and were overlooked by Bentham when he was engaged upon the Australian Flora. Gmelin's name, which the plant must bear, was given when he transferred Gaertner's *Syzygium* to *Myrtus;* he had no other knowledge of the plant than that afforded by Gaertner's meagre description.

An examination of Banks's specimens, which are in fruit, showed that they belonged to a species of *Myrtus* not included in the *Flora Australiensis*. Mr. E. G. Baker was good enough to look through the Australian species in the Kew Herbarium, and some fragments of *M. monosperma* F. Muell. suggested to him its identity with that plant. A comparison of Banks's specimens with Mueller's description entirely confirmed this view; the only difference is in the size of the fruit, which is somewhat smaller (perhaps because unripe) in Banks's specimens. The single seed at once distinguishes *M. nitida* from any species included in the *Flora Australiensis*, and, so far as I know, from those more recently described.

The following description is extracted from Solander's MSS.:—"*Arbor* parva, cortice lævi. *Rami* tenaces, teretes. *Folia* opposita, elliptica, acuminata, integra, lucida. *Petioli* breves, supra planiusculi. *Pedunculi* axillares, interdum solitarii, sæpius aggregati, plerumque simplices, raro ramosi, teretes, filiformes, 1-unciales. *Drupæ* globosæ, immaturæ magnitudine pisi, glabræ, monospermæ. *Calyx* persistens, quadripartitus: laciniis subrotundis, obtusis, vix 1-linearis. *Nuces* immaturæ odorem fortem terebinthi spirant."

It may be noted that the oldest specific name cannot in this case be employed, as there is already a *Myrtus lucida* of Linnæus dating from 1758.

The examination of the Banksian MSS., drawings, and herbarium has convinced me that the names published by either of them in connection with their voyage should stand as of "Banks & Sol.": Banks had much more botanical knowledge, and much more to do with these determinations than is generally supposed.

NOTES ON WEST SURREY PLANTS.

By the Rev. E. S. Marshall, M.A., F.L.S.

During the last three seasons I have met with a few local species or hybrids, which it may be worth while to place on record; some of them were observed in the company of Capt. Wolley Dod, R.A., or Mr. C. E. Salmon:—

Trigonella purpurascens Lam. On the edge of Thursley Common, close to the village, and west of the cricket-ground; scarce, but seen there two years in succession.

Rubus suberectus Anders. Roadside near Cutt Mill, towards Elstead.

Epilobium hirsutum × *obscurum*. Boggy meadow between Little and Great Enton, Witley. Several plants of *E. hirsutum* × *parviflorum* grew in a ditch close by.

Hieracium cantianum F. J. Hanb. Roadside bank near the top of Wareham Hill, Witley, and between Munstead and Bramley. A form differing considerably from the type by the shape of its duller and deeper green leaves and by its greater hairiness, but placed here by Mr. Hanbury, is plentiful near the top of Church Lane, Witley; I have failed to find it elsewhere in the neighbourhood, as yet. Var. *coronopifolium* (Bernh.) is, I think, the prevailing form of *H. umbellatum* hereabouts.

Wahlenbergia hederacea Reichb. In 1898 Miss M. Phear found a single specimen on the wet heath close to Milford Vicarage—a new station for it.

Orobanche Hederæ Duby. Mr. Joseph King, of Lower Birtley, Witley, sent me a fresh specimen which he had found growing in his garden, last August; I suspect that it was of casual occurrence.

Salix triandra L. The usual, if not the only form of this willow, so common by the upper Wey, is var. *Hoffmanniana;* I have seen no female bushes.

Epipactis media Bab. Near Cosford House, Thursley, and near Milford. This is our more frequent plant in S.W. Surrey; in 1888 Prof. Babington wrote to me that he believed it to be the true *media* of Fries.

Iris fœtidissima L. Two clumps in a hedge about a quarter of a mile S.W. of Thursley Church.

Juncus effusus × *glaucus* (*J. diffusus* Hoppe). Near Hammer Pond, Thursley, with the parents; almost, if not quite sterile.

Potamogeton obtusifolius Mert. & Koch. Pond east of the "Half Moon," Thursley.

Carex dioica L. Swamp below Furzehill Pond, Brookwood; plentiful for about twenty yards. Capt. Wolley Dod and I found it in 1895 on the north side of the railway, not far off. At the N.E. corner of this pond (by the road to Pirbright) an *Elatine* was abundant, last June, which, from its habit, is almost certainly *E. Hydropiper;* but I was unable to revisit the spot in autumn for verification.

C. arenaria L. In the Addenda to my friend Mr. Dunn's *Flora of S.W. Surrey*, p. 96, I am credited with having found this in a marsh under Belmont Copse, Albury. We were together on that occasion, but I do not remember what sedge was really seen: anyhow, not *arenaria*, which inhabits dryish sands.

C. paniculata × *remota* (*C. Boenninghausiana* Weihe). A careful search in several likely spots has been rewarded by the discovery of a single tussock in an alder-bed below Rake Mill, Milford, and four tussocks in an alder-bed near the Wey, a little above Charles Hill, between Tilford and Elstead; in both cases the trees had been recently cut, or it would probably have escaped notice. Herr Kükenthal has confirmed his former naming of *C. paniculata* × *vulpina* from Witley, which I collected afresh towards the end of last June.

C. acuta L. Plentiful and variable on the east side of the Basingstoke Canal, a little south of Frimley. Besides the type and a slender spiked form, approaching var. *gracilescens* Almq., I came across some striking plants which might have passed for *acuta* × *Goodenowii*, on the *acuta* side, but were quite fertile. The female spikelets are remarkably erect, rather stout, shorter than in the type ($\frac{3}{4}$–$1\frac{1}{2}$ in.), subobtuse, the upper ones frequently male at the top; male spikelets long-stalked. Herr Kükenthal names my two gatherings "*C. gracilis* Curt. subsp. *erecta* m. (in Kneucker's Allg. Bot. Zeitschr.)" and "forma *brachystachya* m." of the same. I have not had access to his descriptions, but consider these Frimley plants to be a well-marked variety. Typical *C. Goodenowii* and var. *juncella* both grow here. My record of *C. acuta* from Waverley (Fl. of S.W. Surrey, p. 79) is erroneous; I could only find *C. acutiformis* last June. The plant was misnamed for me in 1883 by a friend who was supposed to know sedges rather well; I took no specimens, and had omitted to verify his opinion.

C. Oederi Retz, var. *oedocarpa* Anderss. About a year ago the Rev. E. F. Linton suggested to me that this (as figured in Andersson's *Cyperaceæ Scandinavicæ*) was identical with our *C. flava* var. *minor* Towns. I therefore sent specimens of characteristic *minor* from Fleet Pond, Brookwood, and elsewhere to Herr Kükenthal, who confirmed this view in every case, writing as follows of the Brookwood plant:—"*Carex Oederi* (Retz) var. *oedocarpa* Anderss. This form agrees completely with Fl. Danica, fig. 2794, and with Andersson's description. The character consists in the long beak of the fruit, which, however, points straight forward, and is not reflexed as in *C. lepidocarpa*. Here, also, the spikelets are more spherical, in *C. lepidocarpa* more ovate-oblong." The Fl. Danica figure certainly represents our *minor* very well indeed, and it is probably better placed under *C. Oederi* than under restricted *C. flava*; indeed, where *Oederi* and var. *oedocarpa* grow together, as at Fleet Pond, forms occur which are just intermediate and quite fertile. I am disposed to group our plants as follows:—1. *C. flava* L., with b. *elatior* Schlecht. (if that is really synonymous with *C. lepidocarpa* Tausch). 2. *C. Oederi* Retz, with b. *cyperoides* Marsson, c. *elatior* Anderss., and d. *oedocarpa* Anderss. Of *C. flava*

var. *argillacea* Towns. I have not seen any specimens (from the description, Herr Kükenthal is inclined to refer that also to *C. Oederi*); nor is there any authentic example of Andersson's variety in the foreign bundle at South Kensington. The Yarmouth plant from Herb. Sowerby, gathered by Dawson Turner and figured in E. B. ed. 1 as *C. Oederi*, is var. *oedocarpa*. One of the specimens on my sheet of *C. Hornschuchiana* from Pirbright Common is a hybrid with *oedocarpa*.

C. acutiformis Ehrh. In the Wey valley, about Elstead and Tilford, the usual, perhaps the only form is that with cuspidate glumes (*C. spadicea* Roth).

NEW NATAL PLANTS.

By J. Medley Wood, A.L.S., and M. S. Evans, F.Z.S.

(Continued from Journ. Bot. 1897, p. 490.)

DECADE III.

21. **Scilla palustris,** sp. nov. Bulbus ovoideus coarctans supra, $\frac{3}{4}$–$1\frac{3}{4}$ poll. diam.; folia 4–6, lanceolata, 6–12 poll. longa, $\frac{1}{2}$–$\frac{3}{4}$ poll. lata; pedunculi 4–6 poll. longi, racemi oblongi, $1\frac{3}{4}$–2 poll. longi, laxe multiflori; pedicelli tenues, inferiores 5–6 lin. longi; bracteæ minutæ, deltoidæ, perianthi segmenta erecta, $1\frac{1}{2}$–2 lin. longa; ovarium stipitatum; semina magna.

Hab. Natal: in swamp near Newcastle, 3900 ped. alt., December; *J. Medley Wood*, No. 6501.

Differs from *S. polyantha* Baker by its shorter and narrower leaves, which are usually more than four, by its shorter and denser raceme, and erect not cernuous pedicels.

22. **Albuca affinis,** sp. nov. Bulbus ovoideus, $\frac{1}{2}$–$1\frac{1}{2}$ poll. diam. cum tunicis diffendentibus numerosis fibris apice; folia 4–10 utrinque pedunculo, angusto-linearia, profunde alveata in facie, 3–6 poll. longa, glabra, setosa, interdum duo pedunculi bulbo, 2–12 poll. longi; racemus laxus, corymbosus, $1\frac{1}{2}$–3 poll. longus, pedicelli adscendentes, recurvi, inferiores, pervenientes ad $2\frac{1}{2}$ poll. longos; bracteæ late lanceolatæ cum longo cuspide acuminato, pæne omnino pedicellum amplectentes basi, scariosæ, pluribus venis, media parte nervosa, subfusca, cum lata alba margine membranacea, attingente dimidiam longitudinem bracteæ rotundatæ basi, inferiores $\frac{3}{4}$ poll. longæ; flores perpetuo erecti, perianthium 5–9 lin. longum, album cum lata linea viridi; stamina omnia fertilia, tria autem exteriora minora, et cum minore polline; stylus prismaticus, stigma conicum.

Hab. Natal: on grassy hills, Van Reenen's Pass, Drakensberg Mts., 5–6000 ped. alt., November; *J. Medley Wood*, No. 6503.

This plant seems to be nearest to *A. pachychlamys* Baker, a plant we have not seen; but the raceme is much shorter, bracts are a different shape, and stripe on the perianth is green, not brown.

The three outer anthers are very much smaller than the inner ones, and sometimes have no pollen, never much. We notice that in the *Flora Capensis* the stripe on the perianth-segments of *A. Nelsoni* N. E. Br. is said to be greenish or reddish brown, and that of *A. crinifolia* Baker to be reddish brown; both of these plants have flowered in the Natal Botanic Gardens for several years past, and the band in both is certainly green, only becoming brown in the dried state.

23. **Fadogia humilis**, sp. nov. Suffruticosa, non plus alta quam 6 poll.; caules multi, ex radice ligneo, crasso, ramosi; folia conferta in superiore parte caulium et ramorum, elliptico-oblonga, oblonga, vel oblanceolata, obtusa vel subacuta ad apicem, coarctantia ad brevem petiolum, integra, venis conspicuis utrinque lamina glabra, cum paucis crinibus distantibus subtus in vena media, ciliata, 1–3 poll. longa, $\frac{1}{2}$–1 poll. lata; stipulæ cuspidatæ ex basi lata amplexicaule includentes numerosas albas setas; flores fasciculati in axibus foliorum, pedunculis $\frac{1}{2}$–$\frac{3}{4}$ poll. longis; calyx turbinatus, 5-lobatus, 2 lin. longus, lobis acuminatis, tubam æquantibus; corolla 5-lobata, tuba cylindrica lobio breviore interne tecta crinibus albis, lobis angusto-oblongis, bis longioribus tuba, cum albis crinibus basi; antheræ oblongæ, acutæ, sessiles parum infra sinus corollæ, exsertæ; stigma capitatum, intrusum basi, bifidum apice, exsertum; ovarium 2-loculare, loculis 1-ovulatis, ovula pendula; flores lutei; drupa globosa, coronata vestigiis calycis loborum, carnosa, viridis, $\frac{3}{4}$ poll. diam.

Hab. Natal: near Van Reenen's Pass, Drakensberg Mts., 5–6000 ped. alt.; *J. Medley Wood*, Nos. 4528, 6248.

A low-growing plant with thick, spreading, woody roots, and numerous short stems and branches which are clothed at nodes with remains of stipules and the bristles with which they are furnished. In appearance the plant is very like *Vangueria pygmæa* Schlechter, and is about the same in size and habit of growth. Differs from *F. Zeyheri* in size of leaves, shape and size of stipules, and mode of inflorescence. Our plant is found amongst grass fully exposed to the sun, while *F. Zeyheri* is said to be found in "stony places in woods."

24. **Aster uliginosus**, sp. nov. Caules sæpe cæspitosi, herbacei, ex radice perenne, ascendentes, tecti in parte inferiore; foliis flaccidis, teretes, cum paucis sparsis pilosis crinibus; 6–8 poll. longi; monocephali; folia alterna, conferta in parte inferiore caulis, linearia, integra cum marginibus reflexis, vena media prominente infra, margine ciliato cum longis crinibus albis, $\frac{1}{2}$–1 poll. longa; capitula radiata, floribus radiis purpureis, discis luteis, $\frac{3}{4}$–$\frac{7}{8}$ poll. diam.; squamæ involucrales 3–4-seriatæ, libræ basin, lanceolatæ, exteriores breviores, cum numerosis pilosis albis crinibus ex turgido fusco basi; flores radii feminei, 30–40, ligulati, disci numerosi, 5-dentati fertiles, omnes cum paucis minutis sparsis crinibus in tuba; setæ pappi multæ, serratæ, 1-seriatæ; achænia tecta paucis setis minutis.

Hab. Natal: in damp places, sources of Tugela river, summit of Mont-aux-Sources, March, 1898; *M. S. Evans*, No. 758.

We have no Natal species of *Aster* at all like this plant, nor does the Colonial Herbarium contain any species with which it would be confused.

25. **Felicia pinnatifida,** sp. nov. Plantæ plerumque 2–3 poll. altæ interdum attingentes 5–6 poll., hirsuta; caulis brevissimus, copiose ramosus ex basi, ramis ascendentibus, teretibus, purpureis; folia alterna, simplicia, petiolata, exstipulata, 3–4-pinnatifida, lobis linearibus, oblongis, variantibus ex $\frac{1}{4}$ ad 1 poll. longos; petiolus altus et dilatatus basi, semiamplexicaulis, 2-12 lin. longus; capitula solitaria, multiflora, radiata; floribus radiis purpureis; discis luteis, $\frac{1}{2}$–$\frac{3}{4}$ poll. diam., involucrales squamæ 2–4-seriatæ, lineari-lanceolatæ, cum marginibus membranaceis, exteriore brevissimæ et angustissimæ, subspinosæ in dorso, atropurpuræ; flores radii ligulati, obtusi, disci tubulosi, 5-dentati; setæ pappi multæ, serratæ, uniseriatæ; achænia compressa, minute pubescentia.

Hab. Natal: sources of Tugela River, summit of Mont-aux-Sources, 11,000 ped. alt.; *M. S. Evans*, No. 739.

Differs from all the South African species of *Felicia* known to us by its deeply pinnatifid leaves. Always found in wet gravelly places at or near heads of streamlets.

26. **Felicia drakensbergensis,** sp. nov. Suffruticosa, 6–12 poll. alta, rami lignosi, erecti, seniores glabri, juveniores puberuli, cortice cano; folia conferta ad extrema ramorum, linearia, sessilia, rugosa, erectiformia, pilosa cum albis articulosis crinibus; $1\frac{1}{2}$–12 lin. longis; capitula solitaria, cærulea, in $\frac{3}{4}$–1 poll. longis pedunculis pilosis; squamæ involucrales 10–12, 2-seriatæ, lineares, vel lineari-lanceolatæ, acutæ, pilosæ, 2–3 lin. longæ; radii flores late ligulati, 4-venati; disci tubulosi, 5-dentati; setæ pappi multæ, serratæ, uniseriatæ.

Hab. Natal: Sources of Tugela River, summit of Mont-aux-Sources, 11,000 ped.; *M. S. Evans*, No. 747.

This is quite unlike any other Natal species known to us; it appears to be near to *F. abyssinica* Sch. Bip., but differs in the following respects:—The involucral scales are fewer, and in two, not three to four series; acute, not acutely acuminate; the leaves differ in shape and indument; and the receptacle is fimbrilliferous, not naked.

27. **Berkheya maritima,** sp. nov. Herbacea, erecta, ramosa in superiore parte, 3–4 ped. alta; caulis et rami striati, sparse araneoso-lanati, virides; folia alterna, sessilia, decurrentia in brevem caulinam alam spinoso-ciliatam, lamina oblonga, irregulare sinuata, lobata, lobis præacutis, spina 1–2 lin. longa; rotundatis interstitiis ciliatis cum minoribus spinis variantibus, longitudine $\frac{1}{2}$–1 lin., tenuiter araneoso-lanata et cum articulatis crinibus glandulosis supra, dense albo-tomentosa infra; venis venulisque conspicuis infra, minus quidem supra, 4–8 poll. longa, $1\frac{1}{2}$–3 poll. lata, minus sursum; inflorescentia corymbosa, capitula pauca, radiata, pedicellis longis, cum foliis depauperatis in nodis, lanceolatis, summis minus 1 poll. longis; squamæ involucrales squarrosæ, 4–5-seriatæ concretæ basi, armatæ spina terminale $1\frac{1}{2}$ lin. longa, 1–4 magnis et multis minori-

bus spinis marginalibus, lanceolatæ, 4–6 lin. longæ includentes spinam, dense albo-tomentosæ infra, araneoso-lanatæ supra; flores radii 30–40, ligulati, elongati, 3-nervii, 4-dentati apice, ¾ poll. longi, neutrii; disci ½–¾ poll. diam., tubulosi, 5-lobati, 4–5 lin. longi, lobis lineari-lanceolatis æquantibus tubum; receptaculum convexum; squamæ pappi latæ, laceratæ apice; achænia turbinata, angulata, glabra, nitida.

Hab. Natal: near Durban; *J. Medley Wood*.

This appears to come near *Stobæa scolymoides* DC., a plant of which we have not seen specimens. We have only met with it near the sea-coast.

28. **Oncinotis inandensis**, sp. nov. Caules scandentes, ramosi, teretes, cum cortice obscuro, teneres tenuiter pubescentes, seniores pæne glabri, ramis oppositis, turgidis basi, et plerumque conjunctis annulo duro et ligneo nudis glabrisque infra foliosis supra; folia opposita, petiolata exstipulata, sed juncta annulo interpetiolato, late oblanceolata, obliquo-acuminata apice, basi coarctantia ad petiolum, cum venis venulisque prominentibus infra, et manifestis supra, et cum margine omnino integro, glabra, 2½–4 poll. longa, ¾–1½ poll. lata; petiolus 2–3 lin. longus, curvatus, atro-viridis et basi turgidus; racemi axillares, pauciflori, interdum ramosi, et multo breviores foliis; bracteæ minimæ, ferrugineo-pubescentes, deciduæ, exorientes ex annulo vel vagina basi calycis; calyx 5-fidus pæne basin, tubo turbinato, lobis deltoideis, obtusis, erectis, tenuiter ferrugineo-pubescentibus, 1½ lin. longus; discus 5-lobatus; corolla hypocrateriformis, 5-lobata, lobis lineari-lanceolatis, reflexis, paulo longioribus tubo, sinistrorsum tortis in æstivatione, cum 5 deltoideo-acuminatis squamis in fauce, alternis cum lobis et sextens eorum longitudinis, exsertis, tubo tenuiter pubescente in parte exteriore, et cum albis pilosis crinibus intus; stamina 5, basi tubi corollæ; filamenta brevissima, expansa et pilosa cum crinibus albis basi; antheræ lineari-sagittatæ, acuminatæ apice, 2-loculare, introrsæ, conniventes et adhærentes medio stigmati; stylus brevis; stigma incrassatum elongatum, divisum apice duobus brevibus acutis lobis; carpella 2, ovulis numerosis; folliculi 2, divergentes vel paralleli, cylindracei, acuti, 6–8 poll. longi, glabri; semina lineari-oblonga, minute verrucosa, fusca, comosa apice cum numerosis crinibus albis, semine dimidio longioribus.

Hab. Natal: in woods, Inanda, 1800 ft. altitude, September; *Wood*, No. 1009; October, with follicles, *Wood*, No. 6159.

Hitherto only found in the locality indicated, where it climbs to the tops of the highest trees, and there bears its leaves and flowers.

29. **Chlorophytum Haygarthii**, sp. nov. Radicales fibræ cylindricæ, carnosæ, 3–4 poll. longa; folia radicalia 5–8, late linearia, textura firmissima, obsoleta, scindentia, basi fibris numerosis, 8–12 poll. longa, 4–7 lin. lata, gradatim angustata et basi et apice, tenuiter ciliata, alias glabra, cum 30–40 costis prominentibus; folia caulina multo minora, gradatim diminuentia sursum amplexicaulia; pedunculus robustus, teres, simplex, 4–6 poll. longus basin inflorescentis, pubescens sursum, glaber deorsum; racemus 6–9 poll.

longus, multiflorus, bracteæ duo utrinque flori, exterior lata basi, longo-acuminata, scariosa, 10–13 lin. longa, 4–5 lin. lata; interior multo brevior, lacerata apice; pedicelli erecto-patentes, 1 lin. longi, solitarii; perianthium 7 lin. longum, oblongum, angustatum ad apicem; carina 3-costata; stamina parum breviora perianthio; capsula ovoidea, triquetra cum obtusis angulis; semina numerosa in loculis.

Hab. Zululand: near 'Nkandhla Mts., 4–5000 ft. alt.? Legit W. J. Haygarth, December, 1898 (*Wood*, No. 7448).

Amongst South African species this comes nearest to *C. vaginatum* Baker; is more robust but not so tall, the racemes are longer, the bracts and perianth much larger, leaves are more distinctly ribbed and firmer in texture, and the flowers different in colour.

30. **Alepidea natalensis**, sp. nov. Herbacea, caulis erectus, 12–15 poll. altus; folia radicalia, integra, petiolata, elliptico-oblonga, mucronata, gradatim coarctantia ad planum petiolum alatum, cum margine ciliato setis, aliquando 3 lin. longis, et aliquando extendentibus basin petioli, 3 poll. longa includentia petiolum vaiantem, ex dimidia ad totam longitudinem laminæ; folia caulinia angusto-oblonga, acuminata, amplexicaulia, ciliata, rapide diminuentia sursum et cum numerosioribus longioribus setis basi; umbellæ in laxo paniculo, ramis inferioribus paniculi 3–4 lin. longis, pedicellis superioribus 1 poll. vel minus longis, involucrum 6–7 lin. diam.; foliolis obovoideis, mucronatis, alternis minoribus, omnibus 3–5-nervis; fructus non visus; flores rosei.

Hab. Natal: Karkloof range, 4–5000 ft. alt., February, 1894. Legit J. Wylie (*Wood*, No. 6243).

This plant appears to come nearest to *A. longifolia* E. M., but differs in the following particulars:—Leaves are petiolate, not sessile, cilia of radical leaves are much more numerous, and generally shorter; segments of involucre are broader, obovoid, and mucronate not lanceolate, and flowers are pink not white. In the *Flora Capensis*, *A. longifolia* E. M. is said to be a synonym of *A. Amatymbica* E. & Z., but specimens in the Natal Government Herbarium, which have been certified at Kew, show that the two species are quite distinct.

MIDDLESEX RUBI.

By John Benbow, F.L.S.

The following list, though far from exhaustive, will serve to indicate the distribution of the commoner forms, and help to fill a few of the gaps in the scanty records of the Middlesex brambles. The numbers follow the botanical divisions of Trimen and Dyer's Flora of the county. My thanks are due to the Rev. W. Moyle Rogers for his kind help in naming and verifying the specimens submitted to him.

Rubus Idæus L. 1. Woods about Uxbridge Common and Ickenham; North Wood; Pinner; Stanmore Heath; Bentley Priory; Harrow Weald Common, &c. 2. Littleton, by Bushey Park. 3. Whitton Park, 4. Hampstead Heath; Bishop's Wood; Highgate Woods. 6. Whetstone; Hadley Wood.

Var. *Leesii* (Bab.). Wood near Uxbridge Common.

R. nitidus W. & N. (?). 4. Hampstead Heath. "Apparently *R. nitidus*," *W. M. R.*

R. rhamnifolius W. & N. (sp. coll.). 1. Uxbridge Common; Hillingdon; Ickenham; Ruislip; North Wood; Pinner; Harrow Weald Common; Stanmore Heath; Mims Wood; Harefield Common. 2. Cranford; Feltham; Hanworth; Hampton; Fulwell. 3. Whitton Park; Hounslow. 4. Harrow; Hampstead Heath; Bishop's Wood; Highgate. 5. Perivale; Horsenton; Greenford. 6. Whetstone; Colney Hatch; Finchley; Enfield Chase. 7. South Heath, Hampstead.

R. nemoralis P. J. Muell. var. *pulcherrimus* (Neum.). 1. Woods about Uxbridge Common; Hillingdon; Ruislip and Harefield Woods, &c. 2. Feltham; Hanworth; Ashford Common; Littleton, &c. 3. Whitton; Hounslow; Hospital Bridge; Twickenham, &c. 5. Perivale Wood. 6. Winchmore Hill Wood; Hadley Wood; Enfield Chase. (The common bramble of Districts 2 and 3; but Rev. W. M. Rogers says, "not the typical plant.")

R. mercicus Bagnall, var. *bracteatus* (Bagnall). 1. Ruislip Woods. 2. Littleton Park.

R. carpinifolius W. & N. 1. Wood by Uxbridge Common; Harefield Common.

R. villicaulis Koehl. var. *Selmeri* (Lindeb.). 1. Woods about Uxbridge Common; Ruislip Woods. 4. Near Harrow.

R. Lindleianus Lees. 1. Uxbridge Common; Hillingdon; Ickenham; Ruislip; Northwood; Pinner; Harefield. 2. Hampton; Hanworth; Feltham; Littleton; Fulwell; Teddington; Twickenham. 3. Whitton; Hospital Bridge. 4. Hendon; Mill Hill; Bishop's Wood. 5. Ealing; Perivale. 6. Edgware; Enfield Chase. 7. South Heath, Hampstead.

R. rusticanus Merc. Common.

R. pubescens Weihe, var. *subinermis* (Rogers). 1. Top Wood, N. of Harefield.

R. silvaticus W. & N. 1. Harrow Weald Common. 5. Perivale. 6. Botany Bay, Enfield; Enfield Chase.

R. macrophyllus W. & N. 1. Woods by Uxbridge Common; Ruislip Woods; Harefield Common; Old Park Wood; Top Wood; Garret Wood; Mims Wood. 4. Hampstead Heath; Bishop's Wood; Highgate Woods; Scratch Wood, between Edgeware and Edgewarebury. 5. Perivale Wood. 6. Winchmore Hill Wood; Hadley Wood; Enfield Chase; woods near Potter's Bar. 7. Hedge by Vale of Health, South Heath, Hampstead.

Var. *Schlectendalii* (Weihe). 1. Ruislip Woods. 2. Lane between Harmondsworth and Stanwell.

R. Sprengelii Weihe. 1. Harrow Weald Common; Stanmore Heath; Bentley Priory. 4. Hampstead Heath. 6. Enfield Chase;

woods between North Lodge and Potter's Bar. 7. South Heath, Hampstead.

R. leucostachys Schl. 1. Uxbridge Common and Woods; Cowley; Hillingdon; Ickenham; Ruislip Woods; Duck's Hill; Harefield; Pinner; Headstone Lane; Stanmore Heath; Mims Wood, &c. 2. Feltham. 3. Cranford; Northolt. 4. Hampstead Heath; Bishop's Wood; Highgate Woods; Harrow; Sudbury; Wembly; Scratch Wood; Edgewarebury; Edgeware; Hendon; Mill Hill; Whitchurch; Stanmore, &c. 5. Horsenton; Perivale; Greenford. 6. Winchmore Hill Wood; Hadley Wood; Whetstone; Enfield Chase; Potter's Bar. 7. South Heath, Hampstead.

R. mucronatus Blox. 1. Ruislip Woods (Bayhurst Wood).

R. radula Weihe. 1. Cowley; Hillingdon; woods about Uxbridge Common; Swakeleys and Ickenham; Ruislip Woods; Harefield; Old Park Wood; Pinner Wood; between Potter's Bar and South Mims. 2. Pole Hill; Hayes; Ashford Common; Hanworth; Fulwell. 3. Whitton; near Hounslow; Hospital Bridge and Twickenham. 4. Wembly Park; Harrow; Kingsbury; Edgeware; Bishop's Wood. 6. Enfield Chase. 7. Hedge by Vale of Health, Hampstead Heath.

R. Bloxamianus Colem. 1. Wood by Swakeley's Lodge, near Uxbridge Common.

R. echinatus Lindl. 1. Long Lane, Hillingdon; Ruislip Woods; Duck's Hill; Northwood; Harefield; Old Park Wood; Top Wood. 2. Feltham; Hanworth; Bedfont; Sunbury. 3. Hatton; Whitton Park, 6. Hadley Wood.

R. Babingtonii Bell-Salt. 1. Wood by Uxbridge Common; Swakeleys; Ickenham; Ruislip Woods; Old Park Wood; Harefield. 5. Perivale Wood.

R. scaber W. & N. 5. Horsenton; Perivale Wood. 6. Hadley Wood. "All, I believe, *R. scaber*; certainly the Horsenton plant," *W. M. R.*

R. pallidus W. & N. 1. Ruislip Woods (in Bayhurst Wood abundant.)

R. foliosus W. & N. 1. Woods about Uxbridge Common and Swakeleys; Ruislip Woods; Northwood; Pinner and Pinner Hill; Harefield and Woods; Harrow Weald Common; Stanmore Heath; Bentley Priory, &c. 4. Bishop's Wood; Highgate Woods; Scratch Wood; Edgewarebury; Barnet Gate Wood. 5. Perivale Wood. 6. Winchmore Hill Wood; Hadley Wood; Colney Hatch; Enfield Chase; North Gate Woods; near Potter's Bar.

R. rosaceus W. & N. 5. Perivale Wood.

Var. *infecundus* (Rogers). 1. Woods about Uxbridge Common; Duck's Hill; Ruislip Woods; Harefield; Old Park Wood; Top Wood; Garret Wood; Pinner Woods; Pinner Hill; Harrow Weald Common; Mims Wood, &c. 4. Bishop's Wood; Highgate Woods; Scratch Wood; Barnet Gate Wood. 5. Horsenton Hill; Perivale Wood. 6. Winchmore Hill Wood; between Southgate and Whetstone; Enfield Chase; Potter's Bar.

R. adornatus P. J. Muell. 1. Duck's Hill. 4. Bishop's Wood; Highgate Wood. 7. Parliament Hill, Hampstead.

R. Koehleri W. & N. (sp. coll.). 1. Uxbridge Common; Cowley; Hillingdon; Park Wood, Swakeleys; Mims Wood. 2. Near Fulwell and Teddington. 3. Whitton Park; near Hounslow and Twickenham; Northolt. 4. Bishop's Wood. 5. Between Harrow and Northolt. 6. Winchmore Hill Wood; Enfield Chase.

Var. *pallidus* (Bab.). 1. Woods about Uxbridge Common; meadows between Cowley and Hillingdon; Hillingdon Heath; Park Wood; Ickenham; Ruislip Woods; Northwood; Old Park Wood; Harefield; Top Wood. 2. Teddington; 3. Whitton; between Whitton and Hounslow. 6. Hadley Wood; Enfield Chase; North Lodge Woods; Cooper's Gate.

R. Marshalli Focke & Rogers. 1. Park Wood, Swakeleys.

R. viridis Kalt. 1. Bayhurst Wood; Old Park Wood; Garret Wood. 3. Headstone Lane and copses. 4. Harrow; Sudbury; Wembly Park; Bishop's Wood; Highgate Woods; Hampstead Heath. 5. Northolt Lane. 6. Highgate Wood. 7. South Heath, Hampstead.

R. Balfourianus Blox. (typical forms). 2. Between Harlington and Hatton. 3. Near Hospital Bridge. 4. Wembly Park. 5. By the Brent near Perivale, and canal side by Perivale Wood.

R. dumetorum W. & N. (sp. coll.). Common. Very variable; many hybrids.

R. corylifolius Sm. (sp. coll.). Common.

R. cæsius L. Frequent. Forms from—1. Stanmore Heath; 4. Bishop's Wood; 6. Between Southgate and Whetstone—though "peculiar," the Rev. W. M. Rogers is unable to name.

TEODORO CARUEL.*

On June 27th, 1830, Teodoro Caruel was born at the settlement of Chandarnagar in Bengal, a French enclave on the banks of the Hugli. His father was a French official, and his mother an English girl from Calcutta. From the latter he inherited the tenacity and firmness of his character, and from the former his affable disposition and courteous manners. He came to Italy at the age of fifteen, and, after the family had settled in Florence, was carefully educated, and showed an early aptitude for scientific observation. The genial surroundings of his youth, the stimulating life of the Tuscan capital, his inborn sense of the charm of nature and art, the wealth and variety of the flora of his adopted country, all combined to imbue him with the idea of devoting his energies to some department of science in which he might do some useful work; and thus he almost naturally became a botanist. Early associated with Pietro Savi, Puccinelli of Siena, Orsini of Ascoli, Filippo Calandrini, and Tozzetti, a band of enthusiastic

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* To a certain extent translated and condensed from a biographical memoir by Prof. Oreste Mattirolo, in a recent number of *Malpighia*, supplemented by information from other sources.

and devoted students of botany, with whom he became acquainted about 1850, he undertook with them a series of excursions in the plains of Tuscany, and to the islands off the west coast of Italy, and also to various points of interest in the Apennines. As a result of these excursions there was accumulated a store of materials for study which formed more than a nucleus of the important collection which, at his death, was to go to the university of Pisa. These early years of Caruel were entirely devoted to the study of botany, chiefly in the field; and, in recognition of his industry, in 1858 he was appointed by the Granducal Administration assistant to Filippo Parlatore. Under the direction of his distinguished chief, his natural love of science absorbed all his energies, and consolidated on a firm basis his scientific training.

After acting as assistant to Parlatore for four years, he was appointed coadjutor with him in his official duties; and from this time forward the life of Caruel has been the history of Italian botany, so far as it has been contributed by the Florentine school. At this time the methodical and organizing mind of Parlatore, engined, as it were, with the tenacity and characteristic zeal which was his own, was raising a scientific monument which became a precious heritage to his successors. Florence very justly became the scientific centre to which botanical aspirants in the several Italian states repaired. The Central Italian Herbarium was founded; the Botanical Museum took formal shape; a large amount of material from all parts of the world was assorted, examined, and then placed or mounted in cabinets and cases. The collections were arranged to afford facilities for the examination and comparison of floras of many countries, with special reference to the vegetation of the Italian peninsula. Parlatore then made elaborate preparations to take in hand the Italian flora, and to formulate the systematic arrangement of the plants found to occur therein.

It was at this time, and for some years afterwards, that political events and the factors which were making for the unification of Italy exercised a profound influence on the character and aspirarations of Caruel. He was deeply imbued with the hopes and fears and enthusiastic feelings called forth by the political awakening of his country, and the passing away of the old order of things; and he threw heart and soul into the movement. It is perhaps to be regretted that a man of science should so far forget his lofty mission as to take any serious interest in the ephemeral affairs of politics; but few at that time could help being influenced to some extent by the forces which emancipated men from the coarser associations of what was left of mediæval rule.

Caruel's first contributions to botany, which appeared about this time, showed a sagacious and intimate acquaintance with the Tuscan flora; and soon assured for him a position of recognition as an authority in scientific botany. The herbarium of Andrea Cesalpino, founded about 1563—the most valuable acquisition which the Florentine Museum has the honour to possess—afforded Caruel the opportunity of producing his first important memoir, which followed some short studies on the flowers of *Arum macu-*

latum (1851), and on the formation of the tuberous roots in the *Orchidaceæ*. The *Illustratio in Hortum siccum Andreæ Cesalpini*, published under the auspices of Parlatore, and dedicated to the memory of his father, was published in 1858, when he was in his twenty-eighth year. It not only shows his critical acquaintance with the plants passed in review, but also his felicity of expression in rendering the subject of a modern essay in the academic idiom of classical Latin. This scholarly style, so evident in his first memoir, Caruel utilized with conspicuous success in all his future work, adapting the fluent diction of a classical language to the exigencies of scientific exposition. The *Prodromo della Flora Toscana*, an important manual, published two years later, is the only complete work dealing exclusively with the Tuscan flora, and has fully merited the extensive use which has been made of it for thirty years. He acknowledges in it his indebtedness to Parlatore's ripe experience.

On October 18th, 1862, Caruel was appointed Extraordinary Professor at the University of Pavia, a chair destined to continue the traditions of the school of anatomy and morphology founded by the famous Gasparrini, at that time transferred to Naples. For various reasons he did not take up the duties of the appointment, and on Nov. 11th, less than a month afterwards, he was appointed Extraordinary Professor at the Scientific Academy of Milan, where he remained for a year, and gained many friends. The memories of Florence, however, were dear to Caruel's refined and artistic temperament, and he quitted the industrial centre of Northern Italy. He returned to Florence, as professor of botany at the Medical School, in November, 1863. A few months later, "la bella Fiorenza" supplanted Turin as the capital of Italy.

From the beginning of the sixteenth century a botanic garden had been planted in Florence, near the hospital of Santa Maria, and was under the control of a custodian, who gave occasional demonstrations on the properties of plants used in medicine. Caruel remained Professor of Medical Botany, attached to the school, until April, 1871, after the seat of government had been transferred to Rome. During the eight years' residence in Florence he published twenty-seven memoirs, various in length and scope, and his scientific reputation was now well established. On the death of Pietro Savi he was appointed to the chair of Botany at the Athenæum of Pisa. At Pisa, under more favourable circumstances than those which the medical school of Florence afforded, Caruel found the scientific environment more suitable for the encouragement of pure science, and devoted himself to it with renewed energy. In the prolific period of his residence at Pisa he produced forty memoirs, including works of some length. During these years also he made preparations for continuing Parlatore's monumental work on the Italian Flora, an imposing undertaking, of which the first volume had been published as long before as 1848, and for which Parlatore had pigeon-holed an enormous mass of notes and manuscript for the use of future collaborators in compiling subsequent volumes. The first part of the continuation of

the *Flora Italiana* under Caruel's direction was not, however, issued till September, 1884.

In November, 1880, Caruel once more returned to Florence, as Director of the Royal Botanic Institute, and henceforward devoted himself almost entirely to systematic work, concentrating his attention on the phanerogamic orders which had not been elaborated in the earlier volumes of the *Flora Italiana*. He critically examined the systems of taxonomy adopted by diverse schools of botanists; and in the following year published his *Pensieri sulla Tassinomia Botanica*, a work remarkable for the philosophical grasp of the subject, and classical vigour of the style in which it is written. A further outcome of these studies was his *Epitome Floræ Europæ*, published in parts in 1892, 1894, and 1897. As stated in a brief notice of the work in this Journal (1894, p. 253), "it is accurate and scholarly, and its value is increased by the full and carefully compiled bibliography attached to each genus." In both these works Caruel proposed to placed the *Loranthaceæ* in a separate division, which he called "Anthospermæ," intermediate between Angiosperms and Gymnosperms, though for reasons phylogenetically different from those adduced by Melchior Treub for the segregation of the *Casuarinaceæ*.

Recognizing the misfortune of the suspension of Parlatore's great work, and the possibility of its remaining unfinished, Caruel induced the Accademia dei Lincei to guarantee expenses connected with its continuation, and applied himself assiduously to editing the manuscript left by Parlatore. He also secured, as collaborators, Caldesi, Tanfani, Mori, and Terracciano. In a few years, the species of flowering plants, which reached 1381 in Parlatore's volumes, extended to more than 5000 species. A few orders, however, remain still to be taken in hand, and another small volume would probably complete the work.*

The work undertaken by Caruel from time to time, in the additions and continued improvements of the original Garden of Simples, and the formation and extension of the Herbarium of the Botanical Institute, occupied not only his official time, but the hours which would otherwise have been available for leisure and less exacting pursuits. Though ably seconded and assisted by his colleagues and those under his authority, it may be said that the immense resources of botanical study available in Florence are actually the creation of one master-worker. In August, 1892, Caruel experienced the early symptoms of a malady to which he was a martyr for six years, and was unable to take part in the International Congress of Botanists held at Genoa. He had now, however, the satisfaction of witnessing the prosperous career of the Italian Botanical Society, which he had launched under favourable auspices, having been a vice-president from 1888. The foundation of such a society was proposed by Parlatore in 1874, but was not carried out by him. Towards the close of a long and painful

* From a letter recently addressed by Prof. Leopoldo Nicotra to Signor Stefano Sommier, President of the Italian Botanical Society, it appears that this final volume is now in preparation.

infirmity, borne with exemplary fortitude, it was his lot to pass through the trial figured in Dante's *Purgatorio* :—

> "Memory, intelligence, and will, in act
> Far keener than before; the other powers
> Inactive, almost mute."

Caruel died Dec. 4th, 1898, at the age of sixty-eight; his funeral took place two days later at the Cemetery of the Allori at Florence. As he was a Protestant, the chief pastor of the Waldensian Church in Florence officiated, and at the ceremony the whole of the staff of the Institute and many of his pupils assisted.

As a man, as a *savant*, as a teacher, Teodoro Caruel has left in his life-long work a splendid monument to his memory; and his career is an example of devotion to science for its own sake, unceasing toil in the field of intellectual work, assiduous attention to academical duties, and, combined with these, a refined sense of all that is fair and good in nature, in science, in art, and in common life.

FREDERIC N. WILLIAMS.

THE ALGA-FLORA OF CAMBRIDGESHIRE.

By G. S. West, B.A., A.R.C.S.

Scholar of St. John's College, Cambridge.

(Plates 394–396.)

Continued from p. 225.)

Fam. Nostoceæ.

221. Nostoc microscopicum Carm. 3. Sheep's Green, Cambridge. 5. Chippenham Fen.

222. Anabæna variabilis Kütz. 3. Sheep's Green Cambridge.

223. A. inæqualis (Kütz.) Born. & Flah. 6. Sutton, in ponds. 8. Guyhirne, in ponds.

*224. Nodularia sphærocarpa Born. & Flah. 6. In ditches near Ely: July, 1898. Crass. fil. 6–7 μ; crass. spor. 7·5–9 μ. The filaments possessed an excessively thin hyaline sheath, and the spores were noticed 3–11-seriate. *Distrib.*—France, Belgium, Italy.

225. Cylindrospermum stagnale (Kütz.) Born. et Flah. 5. Chippenham Fen, in peaty pools; Wicken Fen, in peaty ditches. 7. March, in ponds.

Subord. Homocysteæ.

Fam. Lyngbyeæ.

Subfam. Lyngbyoideæ.

*226. Lyngbya major Menegh. 3. Wimpole Park: June, 1898. Trichomes up to 18 μ diam.

227. L. æruginEO-cœrulea (Kütz.) Gomont. 3. Sheep's Green, Cambridge.

228. L. OCHRACEA (Kütz.) Thur. Syn. *Leptothrix ochracea* Kütz. 3. Sheep's Green, Cambridge. 5. Chippenham Fen; Wicken Fen.

Subfam. OSCILLATORIOIDEÆ.

229. PHORMIDIUM MOLLE (Kütz.) Gomont. Syn. *Anabæna mollis* Kütz. 7. In ditches, March.

*230. P. LURIDUM (Kütz.) Gomont. Syn. *Leptothrix lurida* Kütz.; *Hyphæothrix lurida* Rabenh. 2. Dernford Fen, 1 mile S. of Shelford. 3. Coton. 5. Wicken Fen. 8. Guyhirne, in ponds.

*231. P. VALDERIANUM (Delp.) Gomont. Syn. *Leptothrix Valderiæ* Delp.; *Hyphæothrix zonata* (Ces.) Rabenh. 3. In ditch, Comberton, attached to *Cladophora crispata*. 5. Chippenham Fen; Wicken Fen.

*232. P. LAMINOSUM (Ag.) Gomont. Syn. *Oscillatoria laminosa* Ag. 5. Wicken Fen.

233. P. TENUE (Menegh.) Gomont. Syn. *Anabæna tenuis* Menegh. 3. Wimpole Park. 5. Wicken Fen. 7. In ditches, March.

*234. P. ANGUSTISSIMUM West & G. S. West. 5. Wicken Fen, forming, with *Phormidium Retzii* (Ag.) Gomont, a tortuose, intricate stratum.

235. P. INUNDATUM Kütz. Syn. *Lyngbya inundata* (Kütz.) Cooke. 8. Guyhirne.

236. P. RETZII (Ag.) Gomont. Syn. *Oscillatoria Retzii* Ag.; *Phormidium rupestre* Kütz.; *P. papyrinum* Kütz.; *Lyngbya rupestris* (Kütz.) Cooke. 3. Sheep's Green, Cambridge. 5. Wicken Fen.

*237. P. UNCINATUM (Ag.) Gomont. Syn. *Oscillatoria uncinata* Ag. 2. Dernford Fen, 1 mile S. of Shelford. 3. Wimpole Park.

238. P. AUTUMNALE (Ag.) Gomont. Syn. *Oscillatoria autumnalis* Ag.; *O. antilaria* Mertens; *Phormidium vulgare* Kütz.; *Lyngbya vulgare* (Kütz.) Kirchn.; *Oscillatoria subfusca* Kütz. 3. Barton Road, near Cambridge. More or less frequent about Cambridge on damp sandy ground, at the latter end of the year.

239. OSCILLATORIA PRINCEPS Vauch. 2. In the R. Cam, Great Shelford. 3. In a ditch parallel to Burwell Load; Wicken Fen. Crass. trich. 24–26·5 μ.

*240. O. PROBOSCIDEA Gomont. 5. In a ditch parallel to Burwell Load. Crass. trich. 13–14 μ. Not previously recorded from Europe.

241. O. LIMOSA Ag. Syn. *Oscillaria Frælichii* Kütz. 2. Shelford. 3. In a ditch, St. John's College "backs," Cambridge. 4. Histon. 5. Chippenham Fen. 6. Roswell Pits, Ely. 7. Near March.

*242. O. ORNATA Kütz. 5. Chippenham Fen. *Distrib.*—France; Germany; Galicia; United States.

243. O. IRRIGUA Kütz. 3. Mill-race, Sheep's Green, Cambridge. 5. Chippenham Fen.

244. **O. decolorata**, sp. n. O. non in strato distincto sed inter alias *Oscillatorias* reperta; trichomatibus subrectis et brevibus, inconspicue coloratis, apicibus non attenuatis nec capitatis (cellula

apicali hemisphærica), ad dissepimenta non constricta; cellulis diametro paullo brevioribus, dissepimentis distinctis et non granulatis; protoplasmate reticulato decoloratoque cum granulis minutissimis numerosis. Crass. trich. 12–13 μ.

5. In ditch parallel to Burwell Load: Aug. 1898.

This species occurred in considerable quantity amongst *O. proboscidea* and *O. splendida*. The individual filaments are apparently quite devoid of colour, and are never attenuated at the apices, the apical cell being almost semicircular. The cells contain large vacuoles, thus causing the cell-contents to appear somewhat reticular. I can find no species sufficiently near it to deserve mention.

245. O. SIMPLICISSIMA Gomont. 3. Wimpole Park. 5. Chippenham Fen.

246. O. TENUIS Ag. 2. Great Shelford; Dernford Fen, about 1 mile S. of Shelford. 3. Sheep's Green, Cambridge; Comberton; Wimpole Park. 4. Histon. 5. Wicken Fen; Chippenham Fen. 6. Roswell Pits, Ely; Sutton. 7. March.

247. O. AMPHIBIA Ag. Syn. *Oscillaria tenerrima* Kütz. 3. Wimpole Park. 5. Chippenham Fen. 7. In ditches, March. 8. Guyhirne.

248. O. SPLENDIDA Grev. Syn. *Oscillaria leptotricha* Kütz. 5. In a ditch parallel to Burwell Load.

*249. O. ACUMINATA Gomont. 3. Sheep's Green, Cambridge. Crass. trich. 3·5–4 μ. This striking species I have obtained only once, in July, 1898. It has previously been seen only from Italy.

250. SPIRULINA MAJOR Kütz. Syn. *S. oscillarioides* Kütz. Crass. trich. 1·8 μ. 5. Wicken Fen.

Fam. CHAMÆOSIPHONIACEÆ.

251. SPHÆROGONIUM INCRUSTANS (Grun.) Rostaf. 3. Sheep's Green, Cambridge, on *Vaucheria* sp. and *Œdogonium* sp. 8. Twenty-foot River, between March and Guyhirne, on *Œdogonium crassipellitum*.

Order CHROOCOCCOIDEÆ.

Fam. CHROOCOCCACEÆ.

Subfam. CHROOCYSTEÆ.

*252. GLŒOCHÆTE WITTROCKIANA Lagerh. ('Bidrag till Sver. Alg.-fl.,' Ofvers. af K. Sv. Vet.-Akad. Förh. 1883, no. 2, 39, t. i. f. 3, 4; in *Nuova Notarisia*, 1890, 227–231). Syn. *Schrammia barbata* Dangeard 1889. 2. Dernford Fen, 1 mile S. of Shelford. 3. Sheep's Green, Cambridge.

The cell-contents of this plant are most brilliant blue-green in colour, and very granulose; they are the contents of a typical Chroococcaceous alga, and I fail to understand why some authors place this genus in the Chlorophyceæ. Dangeard ('Mémoire sur les Algues,' *Le Botaniste*, sér. i. fasc. 4, 1889) refers it for the time

being to the Tetrasporeæ, but this I cannot agree with. The bristles are excessively thin, 190–260 μ in length, and are attenuated to a very fine apex, near which minute branches or spurs are occasionally developed. In addition to mentioning the presence of zoospores, Lagerheim, in *Nuova Notarisia*, 1890, 231, says "nucleus singulus," and, as this plant is undoubtedly a member of the Chroococcaceæ, it would appear that at least one member of this order, and therefore at least one blue-green alga, is possessed of a definite nucleus. I may mention that one of the most conspicuous features to be noticed is a clear space in the centre of each cell, as though for the retention of a nucleus, and, in fact, this plant appears to be a very convenient one for an experimental attempt to solve the vexed question of the presence or absence of a definite nucleus in any of the Myxophyceæ.

Subfam. Euchroococcaceæ.

253. Glœothece confluens Näg. 2. Dernford Fen, 1 mile S. of Shelford. 5. Chippenham Fen.

254. Aphanothece microscopica Näg. 5. Chippenham Fen.

255. Synechococcus major Schröter. Syn. *S. crassus* Arch. 5. Chippenham Fen; Wicken Fen.

256. **S. roseo-purpureus**, sp. n. (Pl. 395, fig. 10). S. cellulis minutis, singulis vel geminis, oblongis et subcylindricis, polis obtuso-rotundatis, diametro ad 1½-plo longioribus; cytioplasmate roseo-purpureo cum granulis conspicuis paucis. Long. cell. 3·8–9·5 μ; lat. cell. 3·6–6 μ.

5. Wicken Fen, in ditches, amongst *Mougeotia* sp.

This occurred in immense numbers in several ditches at the margins of Wicken Fen; it has characteristically short cells, is rarely much longer than broad, and is of a marked rose-purple colour, the few large granules in each cell being dark and conspicuous.

257. Glaucocystis Nostochinearum Itzigsh. 6. Roswell Pits, Ely.

258. Merismopedia hyalina Kütz. 6. Roswell Pits, Ely.

259. M. violacea (Bréb.) Kütz. 5. Wicken Fen.

260. M. glauca (Ehrenb.) Näg. 3. Trumpington; Lord's Bridge; Wimpole Park. 5. Wicken Fen. 7. Ponds S. of March. 8. Twenty-foot River, between March and Guyhirne.

261. M. punctata Meyen. 8. Guyhirne, in ponds.

*262. M. elegans A. Braun. 5. Wicken Fen. Diam. cell. 6·5–9·5 μ. This fine species, much the largest of the genus, has only previously been met with from a few localities in Germany. The cells are somewhat angular by compression, and are of a brilliant blue-green colour. The families attain a very large size, and contain more numerous cells than those of any other species of *Merismopedia*; those observed were composed of 544–1856 cells, and reached a diameter of over 220 μ.

263. Tetrapedia glaucescens (Wittr.) Boldt. 2. Dernford Fen, 1 mile S. of Shelford. 6. Roswell Pits, Ely. 7. Sutton West Fen.

264. Gomphosphæria aponina Kütz. 5. Chippenham Fen; Wicken Fen.

265. Clathrocystis roseo-persicinus (Kütz.) Cohn. Syn. *Protococcus roseo-persicinus* Kütz.; *Polycystis roseo-persicinus* (Kütz.) Gutw. 5. Chippenham Fen; Wicken Fen. 6. Roswell Pits, Ely. 8. Guyhirne, in ponds.

This plant, described by Kützing as a species of *Protococcus*, was placed by Cohn (in Rabenh. Alg. Europ., Dec. 232–233) under the genus *Clathrocystis* Henfrey, and still later referred by Gutwinski ('Fl. Algar. Galic.,' Rospraw. Wydz. matem.-przyr. Akad. Umiej. Krakow, tom. xxviii. 1895, 439) to *Polycystis* Kütz. Many of the Cambridgeshire ponds and ditches contain a large amount of decaying vegetation, thus affording very suitable conditions for the growth of this alga, and the finely-developed specimens which are found in these situations are quite as "clathrate" as any specimen of *Clathrocystis æruginosa* Henfrey. From a consideration of this character I certainly agree with Cohn in placing the plant under the genus *Clathrocystis*, although young specimens would be quite correctly referred to the genus *Polycystis*. The former genus appears merely to include the more finely-developed examples of species of the latter genus.

266. Polycystis marginata (Menegh.) Richter. 3. Sheep's Green, Cambridge.

*267. P. elabens (Bréb.) Kütz. 5. Wicken Fen. 7. In ditches, March.

268. Porphyridium cruentum (Ag.) Näg. 1. Wall of the Senate House, and by the Leys School, Cambridge. 3. Newnham Mill, Cambridge. I fully agree with Hansgirg in referring this plant to the Myxophyceæ, but think it better to retain it under its original genus than to place it under *Aphanocapsa* Näg. No species of the latter genus ever has the cells so compact as *Porphyridium*, in which at times they become almost polygonal from pressure of contact. There are many red and reddish-purple forms of blue-green algæ, and Batters has given instances of marine blue-green algæ becoming red owing to adaptation to greater depths and less light. Moreover, *Porphyridium* is almost always found solely in association with other Myxophyceæ.

269. Chroococcus turgidus (Kütz.) Näg. 5. Wicken Fen; Chippenham Fen.

270. C. pallidus Näg. 5. Chippenham Fen.

271. C. rufescens (Bréb.) Näg. 5. Chippenham Fen. 7. Ponds S. of March.

272. C. minor (Kütz.) Näg. 5. Wicken Fen. 6. Roswell Pits, Ely.

Class BACCILLARIEÆ.

Order Raphidieæ.

Fam. Cymbelleæ.

273. Amphora ovalis Kütz, 2. Dernford Fen, 1 mile S. of Shelford. 3. Ditch, St. John's College "backs," Cambridge; Sheep's Green, Cambridge; Wimpole Park; Orwell. 5. Fordham; Wicken Fen; Chippenham Fen. 6. Near Ely. 7. Sutton West Fen; near March. 8. Guyhirne.

Var. Pediculus Kütz. Syn. *A. minutissima* W. Sm. 3. Lord's Bridge; Wimpole Park, attached to *Nitzschia sigmoidea*. 5. Chippenham Fen.

274. Cymbella Ehrenbergii Kütz. 3. Wimpole Park. 5. Wicken Fen.

275. C. cuspidata Kütz. 3. Cambridge; Orwell. 5. Fordham; Wicken Fen. 7. Sutton West Fen.

276. C. affinis Kütz. 3. Comberton; Wimpole Park. 6. Sutton; near Ely.

*277. C. delicatula Kütz. 5. Chippenham Fen.

278. C. lævis Näg. 5. Wicken Fen; Chippenham Fen.

279. C. gastroides Kütz. 3. Wimpole Park.

280. C. lanceolata (Ehrenb.) Kirchn. Syn. *Cocconema lanceolatum* Ehrenb. 2. Dernford Fen, 1 mile S. of Shelford. 3. Ditch, St. John's College "backs," Cambridge; Sheep's Green and Barton Road, near Cambridge; Hardwick; Lord's Bridge; Wimpole Park. 5. Fordham; Wicken Fen; Chippenham Fen.

281. C. cymbiformis (Kütz.) Bréb. Syn. *Cocconema cymbiforme* (Kütz.) Ehrenb. 3. Sheep's Green, Cambridge; Hardwick; Wimpole Park. 4. Histon. 5. Wicken Fen; Chippenham Fen. 6. Near Ely. 7. Sutton West Fen.

Var. parva (W. Sm.) Van Heurck. Syn. *Cocconema parvum* W. Sm. 3. Harlton; Comberton; Orwell. 5. Wicken Fen.

282. C. Cistula (Hempr.) Kirchn. Syn. *Cocconema Cistula* Hempr. 2. Dernford Fen, 1 mile S. of Shelford. 3. Ditch, St. John's College "backs," Cambridge; Sheep's Green, Cambridge; Lord's Bridge; Wimpole Park. 5. Wicken Fen. 6. Roswell Pits, Ely.

283. Encyonema turgidum (Greg.) Grun. Syn. *Cymbella turgida* Greg. 3. Sheep's Green, Cambridge; Lord's Bridge.

284. E. cæspitosum Kütz. 3. Sheep's Green, Cambridge; Comberton; Lord's Bridge; Orwell. 4. Histon. 5. Wicken Fen.

285. E. ventricosum (Ag.) Kütz. Syn. *Cymbella ventricosa* Ag. 2. Dernford Fen, 1 mile S. of Shelford. 3. Sheep's Green, Cambridge. 7. Sutton West Fen.

286. Mastogloia lanceolata Thwaites. 3. Wimpole Park. 5. Wicken Fen; Chippenham Fen.

287. M. exigua Lewis. 8. Guyhirne.

288. M. Dansei Thwaites. 8. Guyhirne.

289. Stauroneis Phœnicenteron (Nitzsch.) Ehrenb. 3. Hardwick; Wimpole Bark. 5. Burwell; Wicken Fen; Chippenham Fen. 6. Near Ely.

290. S. anceps Ehrenb. 3. Sheep's Green, Cambridge; Wimpole Park. 5. Burwell.

Var. amphicephala (Kütz.) Van Heurck. 5. Chippenham Fen.

291. S. Legumen Ehrenb. Syn. *Pleurostauron Legumen* (Ehrenb.) Rabenh.; *Stauroneis linearis* W. Sm. 3. Wimpole Park. 5. Fordham.

292. Navicula nobilis (Ehrenb.) Kütz. Syn. *Pinnularia nobilis* Ehrenb. 3. Wimpole Park.

293. N. major Kütz. Syn. *Pinnularia major* (Kütz.) Rabenh. 2. Dernford Fen, 1 mile S. of Shelford. 3. Ditch, St. John's College "backs," Cambridge; Sheep's Green, Cambridge; Comberton; Wimpole Park. 5. Chippenham Fen. 6. Near Ely. 7. Near March; Sutton West Fen. 8. Twenty-foot River, between March and Guyhirne.

294. N. viridis Kütz. Syn. *Pinnularia viridis* (Ehrenb.) Rabenh. 2. Shelford. 3. Sheep's Green, Cambridge; Coton; Wimpole Park. 5. Burwell; Chippenham Fen. 6. Sutton. 7. Near March.

295. N. borealis Ehrenb. 4. Histon, in a ditch, among *Oscillatoria limosa*.

296. N. divergens (W. Sm.) Ralfs. Syn. *Pinnularia divergens* W. Sm. 5. Chippenham Fen.

297. N. Brebissonii Kütz. Syn. *Pinnularia Brebissonii* (Kütz.) Rabenh.; *P. stauroneiformis* W. Sm. 7. Near March.

298. N. subcapitata Greg. 3. Wimpole Park. 5. Chippenham Fen.

299. N. appendiculata Kütz. 3. Orwell; Wimpole Park.

300. N. mesolepta Ehrenb. Syn. *Pinnularia mesolepta* (Ehrenb.) W. Sm. 3. Wimpole Park. 5. Wicken Fen: a form with the lateral margins almost straight.

301. N. oblonga Kütz. Syn. *Pinnularia oblonga* (Kütz.) Rabenh. 2. Shelford. 3. Ditch, St. John's College "backs," Cambridge; Sheep's Green, Cambridge; Wimpole Park. 5. Burwell; Wicken Fen; Fordham; Chippenham Fen. 6. Near Ely. 7. Near March. 8. Guyhirne.

302. N. peregrina (Ehrenb.) Kütz. Syn. *Pinnularia peregrina* Ehrenb. 3. Ditch, St. John's College "backs," Cambridge; Wimpole Park.

*Var. Menisculus Schum. 2. Dernford Fen, 1 mile S. of Shelford. 3. Sheep's Green, Cambridge; Orwell. 5. Burwell. 6. Sutton.

(To be concluded.)

REMARKS ON THE 'CYBELE HIBERNICA,' Ed. 2.

By Rev. E. S. Marshall, M.A., F.L.S.

It may be thought presumptuous on the part of an Englishman, who has not had very frequent opportunities of botanizing in the Emerald Isle, to offer any comments on this admirable reissue by my friends Messrs. Colgan and Scully, who have done their work loyally, conscientiously and well. I have, however, followed the progress of Irish botany with some attention for a good many years; and these brief observations may serve to supplement Mr. Britten's more general review.

Under *Ranunculus trichophyllus* (p. 5) we read:—"The form with floating leaves, variously named *R. Godronii* (Gren.), *R. Drouetii* (Godr.), and *R. radians* (Rev.)." This is loose writing; typical *R. Drouetii* has no floating leaves; and I understand that *R. radians* is now referred by our experts to *R. heterophyllus* auct. angl.

R. parviflorus (p. 9). "Perhaps introduced in all stations." Certainly native at Rosslare (Wexford).

Caltha palustris var. *procumbens* Beck (p. 10). I believe that the Brittas Lake plant cannot be separated from *C. radicans* var. *zetlandica* Beeby.

Fumaria Borœi (p. 18). Add: IV. About Gorey, Macmine Junction and Wexford; apparently frequent in the east of this county.

Teesdalia nudicaulis (p. 38). "Open to some suspicion of being introduced in its only recorded station for Ireland." Unless the Editors have some special knowledge, not here indicated, it is difficult to share their scepticism. *Teesdalia* is a plant of open heaths, banks and sandy wastes, rarely straying into cultivated ground, and then only if adjoining natural habitats.

Brassica Rapa (p. 476). A dwarf state of var. *Briggsii* H. C. Watson is abundant, at least in some years, on the southern (limestone) shores of Lough Mask, both in Galway and Mayo; here it grows at a good distance from cultivation, looking thoroughly wild.

Helianthemum Chamæcistus (p. 478). "In Donegal and Antrim the species was either planted or derived from cultivation." Mr. Hart recorded this in Journ. Bot. for 1893, p. 218 (as a native) from "the limestone between Donegal and Ballyshannon." If the Editors possess evidence to the contrary, it should have been given; in its absence, I should prefer to trust the resident author of the county Flora. Is there a well-attested instance of this rock-rose having been planted out, anywhere?

Viola stagnina (p. 25). Add: IX. Limestone hollows at the south end of L. Mask, Mayo, in considerable quantity (*Shoolbred & Marshall*, 1895); hybridizing with *V. ericetorum* Schrader (*V. canina* auct.).

Cerastium trigynum (p. 479). Doubtless rightly discredited as an Irish plant (a remark which also applies to *Draba rupestris*); in

Scotland it is practically confined to the coldest parts of the higher granitic mountains, seldom descending below 3000 feet. The Portrane locality for *Silene conica* (p. 479) in Co. Dublin, though distrusted by Messrs. Colgan and Scully, appears to resemble those on the Kent and Sussex coasts, where it is certainly wild.

Geranium pusillum and *G. columbinum* (pp. 72-3). Why are these marked as doubtful natives? The latter is unquestionably wild on limestone near L. Mask, in Mayo. *G. pyrenaicum* occupies a very different position in this respect.

Medicago sylvestris (p. 483). The reasons given scarcely justify the relegation of this species to the Appendix; so far as I know (unlike *M. falcata*), it is not a plant of sporadic or casual occurrence.

Trifolium glomeratum (p. 86). A true native at Rosslare; *T. subterraneum* (marked with a sign of distrust) is more likely than not to be equally so at Wicklow. *Lotus tenuis*, "perhaps always introduced" (p. 89), may well be wild on the coast; *e. g.* "edge of cliffs at Balscadden, Howth."

Rubus obscurus (p. 106). I noticed this beautiful bramble in considerable quantity near Wexford, on a second visit.

Rosa involuta (p. 118). Add: IX. In several places near Clonbur, Mayo (*R. pimpinellifolia* × *tomentosa*). Too many absurd "English" names, such as "Unexpanded Rose," encumber the book.—*R. stylosa* var. *systyla* (p. 486). Placed among the excluded species, as "no doubt planted." Has anybody ever seen this in cultivation?

Sedum album and *dasyphyllum* (p. 134). These are starred, as if certainly introduced. Considering that the first is frequent in W. France, Spain and Portugal (it is truly wild in Somerset), and that the second (also a plant of S.W. Europe) was thought by the discoverers to be native in two of its Co. Cork stations, a little more reserve might not have been amiss. The present Editors, however, have only followed Mr. A. G. More's example.

Epilobium Lamyi (p. 489). The Cork specimen determined by Haussknecht is in the British Museum Herbarium. I see no ground for assuming it to have been a "casual," particularly as it was associated with *E. obscurum*; in S.E. and S.W. England it is certainly wild.

Œnanthe pimpinelloides (p. 156). A frequent coast-plant of S. England, S.W. France and Portugal; and thus more likely to be native in Co. Cork than "accidentally introduced": as, indeed, the Editors themselves appear to think.

Valeriana Mikanii Syme (p. 170). In view of Mr. Beeby's exhaustive experiments, this might well have been retained as a distinct species.

Anthemis nobilis (p. 183). Add: VII. Near Mullingar, towards Knock Drin. To the best of my recollection, Mr. Levinge informed me that it was not uncommon in that neighbourhood.

Cnicus Forsteri (p. 194). Having seen the L. Owel plant growing with the supposed parents, I feel satisfied that it is a hybrid (*C. palustris* × *pratensis*).

Crepis taraxacifolia (p. 199) is more open to the suspicion of

being originally introduced than some other species which are discredited, though the Editors accept it as a native; in England it has spread a good deal within living memory. *C. paludosa* descends almost to sea-level in the marshes of the Slaney, near Macmine Junction (Wexford), where it is locally abundant.

Taraxacum palustre var. *udum* (Jord.). Probably frequent in Ireland. I have noticed it near Wexford, at Castletown (Westmeath), near Clonbur and Cong (Mayo and Galway), &c.

Erythræa latifolia Smith (p. 238). Admitted by the Editors without question; but is the Irish plant really Smith's segregate?

Cuscuta Epithymum (p. 249). "Doubtfully native." Mr. Hart evidently thinks otherwise (see Journ. Bot. for 1896, p. 399); and there is no obvious reason for considering his view as erroneous.

Polygonum maculatum (p. 307). Add: IV. Shore of Lough Derevaragh, Westmeath.

Rumex acutus (p. 312). Being accepted by the Editors as *R. crispus* × *obtusifolius*, this should not have been called a variety of the former.

Euphorbia Peplis (p. 520). "No doubt extinct." An annual plant may be really or apparently absent one year, reappearing the next season; so that this judgment is perhaps premature. *E. amygdaloides* (p. 315), which occurs in Portugal, may quite reasonably be claimed as a true native of Cork.

Salix fragilis × *pentandra* (*S. cuspidata* Schultz). I have seen this at Maam (Galway) and Cong (Mayo), leaf-specimens from Cong having been so named by Rev. E. F. Linton; but in both places it was obviously planted.

Under *Orchis incarnata* (p. 345) the Editors say that "restricted *O. latifolia* has not yet been satisfactorily shown to occur in Ireland." This is a mistake; for in the British Museum Herbarium there are specimens from Kilmacthomas, Co. Waterford, collected by Messrs. Britten and Nicholson in June, 1882, which were determined by H. G. Reichenbach as his *O. latifolia* var. *brevifolia*. These are identical with plants found by myself at Rosslare and near Raven Point (Wexford); I have also seen true *latifolia* about Maam (Galway), Cong (Mayo), and elsewhere; but it is certainly much scarcer than *O. incarnata*.

Iris fœtidissima (p. 350). "Nowhere native . . . No doubt in all cases a relic of ancient cultivation." Some of the stations mentioned appear to be quite satisfactory. As it is a purely western and southern plant in Europe, extending into Spain and Portugal, there is great antecedent probability of its occurrence in a wild state in Ireland. Such a locality as "cliffs on Lambay Island, looking native," does not seem open to any strong suspicion.

Sisyrinchium californicum (p. 352). I fail to understand what the proximity of this plant to Wexford Harbour has to do with the local rank assignable to it; for it is about a quarter of a mile away from the shore, and three or four miles in a direct line from the port of Wexford, the harbour in this part forming extensive mud-flats at low tide. The Slaney mouth is still further off, and no stream exists by which roots or seeds could have been conveyed. I

find no cause at present to abandon my deliberate conclusion that the case is probably one of survival, rather than of introduction.

Leucojum æstivum (p. 512). This should not have been placed among the excluded species, being thoroughly established near Macmine Junction, and looking as wild as possible. I hope that some Irish botanist will take the trouble to explore systematically (in May or early June) the Slaney marshes below Enniscorthy, where I expect that the Snowflake will be found to occur pretty generally; it was impossible for me to do this during my short visit.

Sparganium ramosum (p. 365). Var. *microcarpum* Neum. is the only form that I have met with in Galway, Mayo and Westmeath.

Potamogeton angustifolius (p. 376). The plant recorded by Messrs. Linton from L. Derevaragh as *P. decipiens* is this species, which abounds at Cong, both in Galway and Mayo.

P. pusillus (p. 380). Var. *tenuissimus* Koch (confirmed by Mr. Bennett) grows in a slow stream north of Wexford Harbour. I have found *P. filiformis* floating loose in L. Mask.

Zostera marina (p. 383). Var. *angustifolia* Fr. is omitted, though generally (if not always) a well-marked and constant plant; it occurs in profusion on the mud-flats of Wexford Harbour, where I could not find the type. As usual, it is associated with *Z. nana*.

Carex teretiuscula (p. 394). Add: IV. Near Wexford (1897). An additional Westmeath station for *C. paradoxa* is Tullaghan Bog, near Lough Owel, where it is locally abundant.

C. trinervis (p. 400). This is too cavalierly treated by the Editors as "a critical plant scarcely deserving of specific rank;" the Norfolk form, however, comes closer in appearance than the ordinary Continental coast-form to *C. Goodenowii*, though quite well-marked under cultivation.

C. extensa (p. 407). Var. *pumila* Anders. is very characteristic on damp ground at the south side of Wexford Harbour, towards Rosslare.

Brachypodium pinnatum (p. 518). This should, I think, have been removed from the Appendix, on the evidence given respecting its occurrence at Tramore.

Pheyopteris Dryopteris (p. 452). IV. In 1879 I discovered this fern in good quantity, on a hillside overlooking Glendalough, Co. Wicklow; no specimens were kept, as I was then unaware of its rarity in Ireland, and had no herbarium.

In conclusion, I beg leave to express my conviction that the book has few faults and many merits; and that Messrs. Colgan and Scully thoroughly deserve the thanks and congratulations of all who are interested in the botany of the United Kingdom, on the completion of their arduous undertaking.

SHORT NOTES.

Carnarvonshire Mosses.—In a tuft of moss sent me for determination by Mr. W. Ingham quite recently, I detected a few stems of *Hypnum hamulosum* B. & S. The specimen was gathered on the Glydwr Vawr, Carnarvonshire, in May, 1897, by Mr. W. H. Pearson. This is a new record for the Principality, and deserves publishing, as it is a high alpine moss which has not been recorded, so far as I am aware, from any station in Great Britain south of Perthshire. *H. callichroum* Brid., which Wilson records (as a var. of *H. hamulosum*, which it was then supposed to be), from Snowdon, but which is omitted from Griffith's *Flora*, is a much less distinctly alpine plant. Mr. Bagnall agrees with me that there can be no doubt about the identity of the present plant with *H. hamulosum*.—H. N. Dixon.

Gladiolus oppositiflorus = flabellifer.—In the *Index Kewensis* two names in *Gladiolus* are retained as distinct which seem to represent the same species, and, as the earlier of these is not taken up or cited by Mr. Baker, either in his monograph of the *Irideæ* or in the *Flora Capensis*, it may be well to call attention to it. The two are:

flabellifer Tausch. in Flora, xix. 421 (1836), with synonym "*G. floribundus* Hort. Holland. (non Jacq.)."

oppositiflorus Herbert, Amaryllidaceæ, 366 (1837)—"now sold by Dutch nurserymen under the name *floribundus*": Bot. Reg. 1842, Misc. 98.

The citation of the same synonym by each author seems to leave little doubt that the same plant was under consideration, and there is nothing in the two descriptions to show the contrary. Another species, *G. marmoratus*, published by Tausch in the same place, is not quoted in the *Flora Capensis*; in *Index Kewensis* it is cited as if synonymous with some other species, but no equivalent for it is given.—James Britten.

Stachys Betonica in Donegal (p. 157).—I have never gathered *Stachys Betonica* at Portsalon. The note to that effect in *Cybele Hibernica* referred to by Mr. Hart is an error. The only station in which I have seen it in Donegal is near Lough Fern.—M. J. Leebody.

Galium sylvestre Poll. in Surrey.—Some time ago Mr. H. W. Pugsley, of Wimbledon, sent me two specimens of a *Galium* which he had gathered in June, 1894, near Reigate Hill, and which he thought was *G. sylvestre* var. *nitidulum* (Thuill.). I sent the specimens to Mr. Arthur Bennett, who kindly forwarded them to Mr. W. H. Beeby. Both these gentlemen considered the plant to be *G. sylvestre*; but Mr. Beeby expressed a desire to know more about the locality before admitting the species to the Surrey list. Mr. Pugsley informs me that the plant was quite sparingly distributed over a limited area—that there were a few small patches on the open hill-side. It is difficult to see how this species could be any other than a native in such a station. The only previous record for the Thames province is that on p. 262 of Mr. Druce's *Flora of Berkshire*. In the locality there given Mr. Druce is disposed to think the plant (the var. *nitidulum*) "may be a native." From a

comparison of the accounts of the station given in the two editions of Mansell-Pleydell's *Flora of Dorsetshire* it would appear that there is an element of doubt as to the indigenous character of the species in that county; the nearest recorded stations in which it is undoubtedly native are those on the carboniferous limestone in Somerset and Gloucester.—W. West, Jun.

Epipactis atrorubens Schultz. — Miss E. Armitage sends from near Symonds Yat, West Gloucester, a specimen of what is certainly the plant so named by British botanists, but which Nyman (*Conspectus*, p. 688) places (under Babington's name of *E. ovalis*) as a subspecies of *E. latifolia* All. This is an addition to the vice-county. Miss Armitage writes that the Doward Hill (Hereford) plant is quite extinct, the place being converted into a deer-forest. —Arthur Bennett.

Marsea.—In taking up this genus (Rev. Gen. iii. 546), Dr. Otto Kuntze, in accordance with his usual custom, sweeps together all the species of *Conyza*, and places them under *Marsea* with "OK" attached. He has overlooked that one of these was published in the place which he cites from this Journal, and with the oldest specific name. This, with synonymy, is—

Marsea viscosa Britten, Journ. Bot. 1898 (Feb.), p. 53.

Conyza viscosa Mill. Dict. no. 8 (1768)!

C. lyrata H.B.K. Nov. Gen. iv. 70 (1820).

Marsea lyrata O. Kuntze, Rev. Gen. iii. 546 (Sept. 1898).—James Britten.

Dicranum montanum in Leicestershire. — This interesting addition to our local moss-list was made by me last month while botanizing on the outskirts of the Charnwood Forest district. I found the species occurring in good quantity on the trunks in Sheet Hedges Wood, near Groby. There appears to be no previous record of it in this county, although its presence here is not a matter for suspicion, in view of its occurrence in similar localities in Warwickshire, Staffordshire, and Bedfordshire. Sheet Hedges Wood is well known to local botanists, yet this moss seems hitherto to have escaped their notice. The specimens, although of course sterile, were markedly characteristic, and I may mention that Messrs. Dixon and Bagnall agree to the naming. Mr. E. C. Horrell informs me that *D. montanum* is now recorded for eight vice-counties, including one Scottish (Forfar). I think it not unlikely that careful search would ensure the detection of this species in other Leicestershire woods.—A. B. Jackson.

New and Rare Scottish Hepaticæ. — The following species recently collected by Mr. Symers M. Macvicar are to be added to those collected by him, and recorded in the pages of this Journal for 1898-9. Further particulars as to localities, &c., will be given in the list of Hepaticæ of West Inverness which Mr. Macvicar is preparing for publication :—

New to Scotland:—*Lejeunea calcarea* Lib., *Kantia arguta* (Mart.), *Scapania aspera* Mull. & Bern.

New to West Inverness:—*Radula aquilegia* Tayl., *Lepidozia cupressina* (Sw.), *Cephalozia lunulæfolia* Dum., *C. fluitans* (Nees),

Hygrobiella laxifolia (Hook.), *H. myriocarpa* (Carr.), *Scapania irrigua* (Nees), *Jungermania exsecta* Schmid., *J. lycopodioides* Wallr., *J. gracilis* Schleich., *J. bicrenata* Schmid., *Fossombronia cristata* Lindb.—W. H. Pearson.

Draba muralis L. in Kent. — On May 21st I found *Draba muralis* growing on bare chalky ground at the edge of a wood near Olantigh Park, Wye. The wood borders on the Downs, and the plant grows in considerable quantity just outside the wood and for a few yards inside. There is a specimen in the British Museum Herbarium from "Oxford," with no fuller details of the locality, and another from Bedfordshire—presumably in both cases from chalk. Otherwise the nearest localities in which it has been previously noticed appear to be on limestone in Dorset and Somerset. —Cecil R. P. Andrews.

[The Oxford specimen to which Mr. Andrews refers is from Robert Pocock's herbarium; Mr. Druce (Fl. Oxf. 34) says, on Baxter's authority, that it was a weed in the Oxford Botanic Garden in 1831. Bedford is queried in the first edition of Top. Bot., and omitted from the second, but without reason: the figure in *English Botany* (t. 912) is taken from specimens "gathered by the Rev. Mr. Abbot, in flower April 14 last [1801], on the Wardon Hills, near Barton-in-the-Clay, Bedfordshire," as indicated on the original drawing and in the text accompanying the plate. The specimen in Abbot's herbarium is correctly named (see Journ. Bot. 1881, 46).—Ed. Journ. Bot.]

NOTICES OF BOOKS.

British Botany.

Flora of Kent: being an account of the Flowering Plants, Ferns, etc., with notes on the Topography, Geology, and Meteorology, and a History of the Botanical Investigation of the County. By Frederick Janson Hanbury, F.L.S., and Edward Shearburn Marshall, M.A., F.L.S. London: F. J. Hanbury, 37 Lombard Street. 8vo, cl., pp. lxxxiv, 44; 2 maps. Price 12s. 6d.

The Flora of Cheshire. By the late Lord De Tabley (Hon. J. Byrne Leicester Warren, M.A.). Edited by Spencer Moore. With a Biographical Notice of the Author by Sir Mountstuart Grant Duff. Longmans: 8vo, cl., pp. cxiv, 399, portr., map. Price 10s. 6d. net.

The Glasgow Catalogue of Native and Established Plants: being a contribution to the Topographical Botany of the Western and Central Counties of Scotland. [By Peter Ewing, F.L.S.]. Second Edition. Glasgow: P. Ewing, Uddingston. 8vo, cloth flush, pp. 166. Price 2s.

If we were influenced by externals, we should not be prepossessed in favour of any of these additions to our knowledge of the distribution of British plants. We have never seen a book with an uglier

or more unsuitable binding than that of the *Flora of Cheshire*. Undertaken as a memorial to one who as a man was shy and retiring, and whose fame as a botanist rests largely on his knowledge of the genus *Rubus*, it bears on its front a gilded coronet and a representation of a bramble the like of which never has been and never will be seen so long as the world lasts. The *Flora of Kent* is inoffensive compared with this, but the green of the cover is not pleasant, and is easily soiled, while the lettering is ugly. The cover of the *Glasgow Catalogue* is a dirty grey with hideous black lettering.

Fortunately it is with the contents of the books that we are mainly concerned, and here we are able to give a very different verdict. Mr. Ewing has done good service by bringing together in a handy and cheap form the numerous scattered records for Western and Central Scotland, including Watson's Vice-counties 75–110. It forms an important and indeed a necessary supplement to *Topographical Botany*, and we think it is unfortunate that this should not appear more prominently in the title, which, as it stands, hardly indicates the importance of the work. The introductory remarks are not well expressed, but the author's meaning is usually clear: though we confess we do not understand the remark on nomenclature—"this is a botanical subject where silence is more precious than rubies!" Mr. Ewing says he has "tried to use" the spelling of the *London Catalogue*, but the printer has sometimes thwarted his attempts, as the second genus stands as "Thalictrium." The list of "names of authors commonly cited" (*i. e.* an explanation of the abbreviations in general use) would not, we think, be useful, even if it were accurate, which, in the only example we have tested, it is not; and the spelling of the names sadly needs revision.

Mr. Spencer Moore, in his short introduction to the *Flora of Cheshire*, explains the reasons which have led to its publication, not only as a contribution to science, but as "a fitting memorial" to its lamented author. Botanists had almost ceased to hope that the task to which Warren—for by that name he will always be remembered among those who knew him during the best period of his botanical work—had devoted so much patient investigation and careful study would ever be completed; and although in its present form it has not the completeness which its fastidious and critical compiler would have desired, Lady Leighton has conferred a benefit upon science by its publication. Mr. Moore, while scrupulously following the author's MSS. and directions, so far as these latter existed, has wisely supplemented the work by the insertion of later records culled from various publications, all such additions being placed in []; localities, similarly indicated, have been contributed by Captain A. H. Wolley Dod; and Mr. Moyle Rogers has revised, and "as far as possible brought into line with present-day knowledge," the Roses and Brambles.

The memorial character of the work is indicated by a charming memoir of Lord de Tabley, from the practised pen of his friend Sir Mountstuart Grant Duff, containing specimens of his published verses and of his unpublished correspondence. It is, we think, to be regretted that the notice which appeared in this Journal for 1896

was not reprinted, as it gives a fuller record of his botanical work as a whole than is to be found elsewhere, and also a botanical bibliography, which is wanting in this volume. It would also have supplied certain information bearing on the flora which seems to have been overlooked; *e. g.* we find no reference to the plant which Warren called *Callitriche Lachii* (from the Lach Eye meadows near Chester, where he found the plant), and described as a new species.* The same notice contains an account of the genesis of the Flora, which will not be found in the book itself.

Those who remember the old days when Trimen, Warren, Newbould, and one or two more, were the leaders among field botanists, will be glad to find in this Cheshire Flora a tribute to the accurate and painstaking work of F. M. Webb, who was intimately associated with them in their work. Like Newbould, Webb was averse from publishing, and the entries standing under his name in our catalogues are but few. "During the early seventies Mr. Webb was engaged by the author to assist him in elucidating the Cheshire Flora, and to the energy and success with which he applied himself to this task the following pages bear eloquent testimony." An example of his careful methods of investigation will be found under *Vicia lutea* (p. 89).

So much had been done by Warren towards the completion of the work, that the "preliminary explanations," the "comital districts," and the very interesting accounts of the Bucklow Hundred and the Wirral district are printed as he left them; these, especially the latter, are excellent examples of botanical topography. The habitats of the species are often described with much care and accuracy, and, like the notes upon certain species, bear in certain terms of expression the stamp of the author's individuality. The "list of persons connected in the past with Cheshire botany" is full and interesting; we are inclined to think that the cautionary note regarding J. F. Robinson's inaccuracies might have been even more strongly worded, and that certain plants which stand only upon his authority—e. g. *Pyrus torminalis*—require confirmation before they can be accepted as accurate.

A word of praise is due to Mr. Spencer Moore for his careful editing of this important Flora.

The London botanist has for many years looked forward to the completion of the Floras of Kent and Surrey, and it may be hoped that the appearance of the one may be followed at no distant date by the publication of the other. It is twenty-six years since Mr. Hanbury announced in this Journal that he had taken up the preparation of a Flora of Kent, and for many years afterwards his holidays were spent in the county in the collection of material. In the life of a busy man work of this kind must necessarily occupy a secondary place, and it is not to be wondered at that the publication was delayed, and that Mr. Marshall's aid had be called in for the completion of the book. It was emphatically worth waiting

* It is now referred to *C. obtusangula*, and is doubtless included in the *Flora* under that name.

for, as it may take rank with the very best of our county floras, if indeed it may not be placed at their head.

Had the *Flora of Kent* been compiled on the lines of the *Flora of Berkshire*, it would have occupied something like 1200 pages; as it is, we have an easily portable volume, more than a third smaller than Mr. Druce's book. In order to facilitate use in the field, an edition on thin paper has been provided suitably bound in limp leather, which is far from dear at its price of 15s. We believe that subscribers received in return for their guinea a copy of each impression, and they certainly have good value for their money. There is a careful repression of irrelevances, and an equally careful avoidance of repetition; the introductory essays on the geology and meteorology, and especially Mr. B. D. Jackson's "historical summary," condensed with much skill into twenty pages, are models of what such things ought to be. It is possible that in their anxiety to avoid occupying space by details of the county distribution of common plants, the authors have occasionally erred in an opposite direction. But opinions will always differ in matters of this kind; and the authors have no doubt good reason for considering *Carum segetum* so general as to need no specific localities, and *Lysimachia Nummularia* sufficiently uncommon to occupy a page, although our own experience would lead us to an opposite conclusion. We think, too, that it would have been well to have included in [ ], as is done in the *Flora of Middlesex*, localities in which a plant must for very many years have been extinct, although Londoners, of course, do not expect to find *Sium latifolium* or *Ranunculus Lingua* "in the ditches between Redriff and Deptford." A valuable feature of the book is the notes upon forms and varieties occurring in the county; in this respect it approximates to Mr. Archer Briggs's *Flora of Plymouth*. The critical genera and species have received much care, and the assistance of experts has been obtained when needed.

We note only one omission of importance, but that is sufficiently remarkable to demand attention; we refer to the almost entire absence of any recognition of Robert Pocock (1760–1830). So far as we can see, the only work for which he is cited is his *Natural History of Kent*; he is hardly more than named by Mr. Jackson in his historical summary, nor is any reference made to his herbarium, or to the biography, including his journal which abounds in notes on plants, published by Mr. G. M. Arnold in 1883. This is the more remarkable because in this Journal for 1884 (pp. 53–55) we called attention to the biography and its botanical value, and to the presentation of Pocock's collection to the National Herbarium; and we then extracted some of his notes on *Orchis hircina*, to which some reference should have been made.

We see that the authors have not heard of the Lizard Orchis having been gathered "during the last few years." A paragraph has lately gone the round of the papers mentioning its rediscovery in East Kent; of this Prof. Percival, of the Royal Agricultural College, Wye, has kindly sent us particulars. The specimen was found in a rough bouquet of wild flowers gathered by a child, and was a very fine specimen, the spike consisting of upwards of sixty

flowers. The plant is coming up this year, and it is satisfactory to know that it is in a position whence it is not likely to be exterminated.

We are glad to notice the absence from the *Flora of Kent* of the absurd "English names" which too frequently disfigure local floras, and which are painfully conspicuous in the *Flora of Cheshire*, where even the critical species of *Rubi* are furnished with these useless appendages. Plants with well-known English equivalents here appear with new names, e.g., *Centaurea Cyanus* is called "Corn Knapweed." This seems the more ridiculous, inasmuch as Mr. Holland's *Cheshire Glossary* contains a full list of the plant-names in use in the county. As a set-off it may be mentioned that Mr. Moore gives us a full index, in which specific as well as generic names are included; in the Kent Flora the species of *Rubus* and *Carex* only are given. Neither Flora takes cognizance of the Cryptogams after *Characeæ*.

In the careful and excellent printing of both, the *Flora of Middlesex* seems to have been taken as a model, and no better could have been chosen. Both Floras are important additions to our stock of such works, and both, from the numerous interesting notes they contain, are well worth the attention of botanists who are in no way associated with the counties with which the works are concerned. Our only regret is that the space at our disposal does not permit us to dwell upon, or even to point out, the many matters of interest which each contains; but we shall have best done our duty towards them by sending our readers to the books themselves, both of which deserve the highest commendation.

JAMES BRITTEN.

NATIVE AMERICAN FRUITS.

Sketch of the Evolution of our Native Fruits. By L. H. BAILEY. 8vo, pp. xiii, 472, with 125 figures. New York: The Macmillan Co., 1898. Price 7s. 6d.

Bush-Fruits. By F. W. CARD. 8vo, pp. xii, 537, with 113 figures. New York: The Macmillan Co., 1898. Price 5s.

THERE is a refreshing originality about Professor Bailey's books, and the one we have just read is no exception to the rule. This sketch of the evolution of some of the commonest native American fruits is historical as well as botanical. With the story of the development of the grape, the mulberry, the plum, or the apple, is interwoven the history of the workers. The tale of the individual is generally one of long struggle with ignorance and want of means, ending often in disappointment and sometimes ruin, more rarely in success. One point comes out very strongly, namely, the latent value of endemic plants. It is sometimes suggested that man should let well alone, and rest satisfied with the cultivation of the products he has already evolved. Prof. Bailey demonstrates the advantage of starting afresh in a new country with the native plants: of this the story of the vines is a remarkable illustration. So long

as the old-world stocks were used the new-world growers met with nothing but failure; success was possible only when the wild American vine became the subject of experiment. The result is quite a new fruit, essentially a table fruit in contrast with the European, which is a wine fruit, or, as the author puts it, "European writings treat of the vine, but American writings treat of grapes."

The systematic botanist will be glad to have the exhaustive synopses of native American vines and brambles which form appendices to the chapters dealing respectively with these fruits. Professor Bailey has been at considerable trouble to get at the bottom of things, and his unravelling of the *Rubi* entailed visits to our own and other European herbaria for the purpose of consulting the types of Aiton, Willdenow, and others, several of which are admirably reproduced as illustrations. Investigation of the brambles led to the startling result that the common American species, owing to confusion of nomenclature, had no name! Prof. Bailey proposes to call it *Rubus nigrobaccus*. Besides the grape and brambles, chapters are devoted to "The Strange History of the Mulberries," "The Evolution of American Plums and Cherries," "The Native Apples," "The Origin of Raspberry-growing," "Various Types of Berry-like Fruits," and "Various Types of Tree Fruits," and the book fittingly concludes with a few "General Remarks." The volume is well illustrated, many of the figures being full-page plates. They include useful sketches of habit, figures of fruits, and also portraits of some of the old workers. Those who are interested in fruit-plants from a cultural point of view will find much of interest and profit in the book, while for the pure botanist it supplies a valuable chapter on practical evolution.

Professor Card's *Bush-Fruits* is less generally interesting, but more practically useful. It is described as a horticultural monograph of raspberries, blackberries, dewberries, currants, gooseberries, and other shrub-like fruits, and is the first of a proposed series of monographs on the various types of American fruits. Prof. Bailey is the editor of the series, and the author of the present volume was a bush-fruit grower before he was a university student and a teacher of horticulture.

The ordinary botanist will hardly find time to read a book so admittedly technical, unless he is wont to relax in a garden of his own and takes interest in the growth of currant- and gooseberry-bushes. In such case let him get the book at once, and realize the four pounds weight of fruit per plant which may be expected from the former, or the prickleless form which is the desideratum in the latter. Though written for American growers, the volume contains much that will be helpful in this country. It also supplies interesting confirmation of the fact so strongly brought out in Prof. Bailey's book, namely, the superiority of endemic productions. Thus, in speaking of English varieties of the gooseberry, the author says:—"Like all European fruits, they have been tried again and again, yet they have only succeeded here and there, when meeting peculiarly

favourable conditions . . . the general fact remains that the English gooseberry is not a success in America. It may produce a few good berries when young, but is almost sure to fail later." The reason for this failure is that the English varieties are constantly attacked by mildew, in spite of remedial mulching with manure, stones, tin cans, old boots, or other strange material.

The bush-fruits are treated under three headings: the brambles including raspberries, blackberries, and dewberries; the groselles—a word coined by the author "from the old French word *groiselle* or *groisselle*"—to include both currants and gooseberries, in the original sense of the word; and miscellaneous types. The last contains a short account of a few species of minor importance, such as the huckleberry, juneberry, barberry, and others.

In the two more important sections are chapters dealing with insect and other pests, and also one on the botany of the group. The latter is a useful systematic synopsis of the species and marked natural varieties of the genera *Rubus* and *Ribes* respectively which are native to North America or there cultivated. The figures, of which there are one hundred and thirteen, form a useful addition to the subject-matter, and there is an exhaustive index.

A. B. Rendle.

Lectures on the Evolution of Plants. By Douglas Houghton Campbell, Ph.D. 8vo, pp. viii, 319, with 60 figures in the text. New York: The Macmillan Co. 1899. Price 4s. 6d.

In this volume the author has endeavoured to present in as untechnical a manner as seemed feasible the more striking facts bearing upon the evolution of plant forms, in the hope of interesting not only such botanists as have not concerned themselves specially with this phase of the science, but also zoologists, and those general readers who are interested in biological problems. The substance of the chapters was recently presented in the form of a course of lectures at Stanford University. They make a readable little book for the botanical student who has been through an elementary course, and will help such a one to correlate the life-histories of the various types which he has examined. As was to be expected, the *Anthoceroteæ* occupy an important position in the phylogeny of the higher plants, but the student who has not had the benefit of Professor Campbell's teching will hardly understand the prominence assigned to this group of Hepatics. In this and also in other points the writer takes too much for granted. For instance, we find "leptosporangiate" used as a familiar term without definition, and other cases might be cited. This assumption of a too high standard of knowledge renders many of the chapters incomprehensible to the zoologist or general reader, and is the greatest fault of the book. We question, moreover, the advisability of putting before either the student or general reader the wonderful genealogical trees showing the supposed relationships of the subdivisions of Monocotyledons and Dicotyledons, and of these two great groups to each other. They may embody certain probabilities, but they certainly assume much besides for which there is very little warranty.

The author has been at considerable trouble to prepare the drawings for his figures from nature, and we commend his zeal, but we would suggest that some of them would have been clearer had they been larger.

We should like to have been able to write a more appreciative review, but our feeling in closing the book is that the author has been perhaps a little too ambitious. The story of the evolution of plants is long and difficult, and still remains to be told within the narrow limits of a book such as the one before us. A. B. R.

The Moss Exchange Club: Reports for 1896-8.

A somewhat detailed report of the working of this Club during the three years since its commencement in 1896 has recently been issued by the Secretary. The Club has each year shown a steady increase in the number of its members, of whom there are now thirty-six, and during the three years of its existence about 6300 Mosses and 1000 Hepatics have been sent in and distributed. It is not thought advisable greatly to increase the number of members, but it is suggested that a junior branch or a section for beginners should be organized. Such a section could have more frequent distributions, and its chief aim would be to supply beginners with correctly named examples of the commoner species, and to name their own specimens. It would thus act as a feeder to the parent society. It is also desirable to have a section for the exchange of foreign species.

After each distribution a Club note-book has been sent round, in which notes and criticisms have been made by the members. A selection from these notes is included in the present report, which thus affords an opportunity for the correction of a number of errors in identification, as well as for the discussion of interesting and unusual forms, and the recording of new county records. Among the more interesting plants which have given rise to discussion are *Dicranum Bonjeani* var. *rugifolium*, *Fissidens adiantoides* var. *collinus*, *Webera Ludwigii* var. *elata*, *Tortula angustata*, *Barbula rigidula*, where the presence of axillary gemmæ was pointed out as apparently a constant feature, affording a valuable aid in distinguishing this species from *B. vinealis*, and a form of *Fontinalis Dixoni* from Chatsworth, Derbyshire, which, although coming nearer to *F. Dixoni*, connects it somewhat closely with *F. squamosa*, and renders the specific value of the former more doubtful.

A small number of specimens only were sent in to be named by the Club referee. The report further contains instructions as to the mode of preparing the specimens to be sent in, and draws attention to the fact that the plants are meant for the herbarium, and should be adequate in amount and properly cleaned. There is also a list of the members, with the number of Mosses and Hepatics sent in by each, and a balance-sheet, both of which show that the Club is in a flourishing condition. It may be convenient to give the Secretary's address, from whom further particulars of the Club can be procured:—Rev. C. H. Waddell, Saintfield Vicarage, Co. Down.

LEGRÉ (Ludovic). *La Botanique en Provence au XVI^e Siècle: Hugues de Solier.* Marseilles: Barlatier. 1899. 8vo, pp. 45.

RECENTLY (pp. 88–92) we reviewed a previous contribution by this author to the history of Provençal botany in the sixteenth century. M. Legré has speedily produced a successor, whose title is given above. While both works exhibit the same painstaking accuracy, the interest in them is curiously diverse. In the former essay we had to do with well-known names, and our attention was chiefly drawn to the readjustment of merit between the two authors Pena and Lobel, with additional information which considerably modified previous estimation of their respective share in the *Stirpium Adversaria*. The present essay deals with a man whose name is unfamiliar; it does not appear in either edition of Pritzel's *Thesaurus*, while in Haller's *Bibliotheca Botanica* it occurs as that of an editor only; it is also absent from the great French biographies, M. Legré therefore introduces to our notice an entirely new acquaintance.

Hugues de Solier, otherwise Hugo Solerius, was undoubtedly the earliest of Provençal botanists; he was born at Saignon, in the arrondissement of Apt, near the beginning of the sixteenth century, but the exact date is unknown. Having decided to adopt the medical profession, he studied in Paris under Jacques Dubois, otherwise Sylvius, and was there in 1543. From indications given in his *Scholia*, he travelled over France, and was at Lyons in 1547. Next we find him in Italy, even as far as Naples; subsequently he settled at Grenoble, where he was living in 1565. Little is known of his career, save from chance hints in the correspondence of Conrad Gesner and Johann Bauhin, to both of whom he was known. His sole contribution to the botany of his native land is his *Scolia*, or Annotations to the first two books of Aetius Amidenus, a native of Amida, in Mesopotamia, and a medical writer who lived at the end of the fifth and the beginning of the sixth centuries. His works were written in Greek, from which they were translated by Johann Hagenbut, known as Janus Cornarius. Solier's annotations were prefixed to the Lyons edition of Aetius which came out in 1549, and amount to twenty-eight pages in double columns, folio. This portion of Aetius's work is devoted to materia medica, chiefly of plants, and M. Legré gives a list of two hundred and twenty-eight which are recognizable as being of Provençal origin; the list consists of Solier's names, the modern equivalent, and the vernacular. It seems that he also occupied himself on commentaries on Theophrastus, but these did not see the light; M. Legré suggests that Solier may have died before their completion.

The author of the essay in question, though restricting his attention to the early botanists of Provence, is really adding to our knowledge of the botany of the period throughout Europe, when botanists were few, but travelled much from one seat of learning to another, and the books they wrote were largely taken up with criticisms of each other's performances. The entire botanic commonwealth is greatly indebted to M. Legré for his assiduity.

B. DAYDON JACKSON.

Phycological Memoirs.

The *Proceedings* of the California Academy of Sciences, ser. iii., vol. i., no. 24, Botany, dated Oct. 31, 1898, has at last reached this country. The number consists entirely of work by Mr. De Alton Saunders, and is entitled "Phycological Memoirs," a title which had been previously applied in this country to the volume edited in 1892–5 by Mr. George Murray.

Mr. Saunders's paper is divided into two parts: I. "Some Pacific Coast *Ectocarpaceæ*," and II. "*Sphacelariaceæ* and *Encœliaceæ* of the Pacific Coast." A diagnosis is given of the Natural Orders, with a synopsis of the genera in each Order represented in California.

In the first part, which from its title is obviously not meant for an exhaustive record of the Pacific Coast, twenty-six species and varieties are described belonging to *Phycocelis*, *Streblonema*, *Ectocarpus*, and *Pylaiella*. Among these there are seven new species and four new varieties of *Ectocarpus*, and although the actual diagnosis of each novelty is full, there is much to be desired in the way of further comments and comparisons with existing species. In a genus of such unstable limits as *Ectocarpus*, all extra aids to the correct naming of species ought to be freely given by the creator of new forms. The most interesting of those here described is *E. corticulatus*, so named from its close covering of fine cortical filaments, which in the lower portions of the thallus "apparently" bear the plurilocular sporangia. Truly a new departure for *Ectocarpus!* The plate which is devoted to the figures of this species arouses a desire for an examination of the living plant and—more easily obtainable—a fuller "explanation of plate." Under *Pylaiella*, two new varieties of *P. littoralis* are added to the large number of those already existing.

The second part, dealing with *Sphacelariaceæ* and *Encœliaceæ*, describes twenty-two species and varieties, of which only three species and one variety are new. These are *Sphacelaria didichotoma*, so called from having "twice dichotomus" (*sic*) propagula, *Scytosiphon bullosus*, *Colpomenia tuberculata*, and *C. sinuosa* var. *expansa*. It is interesting to note that in the figure of this new variety of *Colpomenia sinuosa* the cryptostoma hairs in the centre of the sorus are sunk into a depression. This is possible on account of the much greater thickness of the thallus as compared with the typical *C. sinuosa*, in which the hairs from lack of space are forced to arise from the same cortical row of cells as the sporangia.

A new genus, *Halorhipis*, is formed for *Punctaria Winstonii* Ands. This plant has been sometimes confused, in books at least, with *Coilodesme californica* Kjellm. To speak of no further difference, the fruits are entirely dissimilar, and the descriptions and figures given by Mr. Saunders will doubtless put an end to such confusion for the future.

A somewhat inadequate description of *Soranthera ulvoidea* Post. et Rup. ends these Memoirs. The parasitic nature of this interesting plant is not mentioned; and as the earlier stages of its life-history have perhaps not been minutely investigated by Mr. Saunders, the

possibility (if it amounts to no more) of the bodies which arise from the peripheral cells being plurilocular sporangia of the *Chordaria* type, is passed over. The twenty-one plates, with numerous figures of the algæ described in the text, are most welcome, especially those of the new species; and the whole work is a valuable addition to phycological literature.

A list of Algæ collected by Dr. Schauinsland in the Pacific (Sandwich, Chatham and Samoa Islands, New Zealand and Adelaide) is published by Major Reinbold in the Abhandl. Nat. Ver. Brem. Bd. xvi. Hft. 2, 1899. This increases the number of algæ hitherto recorded from the Chatham Islands and Samoa, and adds a new species of *Corallina*, *C. Sandwicensis*, and a new variety, *longifila*, of *Corynophlæa Cystophoræ* J. Ag.

Another list of Marine Algæ, from Investigator Street (South Australia), collected by Miss Nellie Davey, is published by Major Reinbold in *Hedwigia*, Band xxxviii. Hft. 1, p. 39, 1899. This part of the coast has not been worked before, but the records are not other than might be expected.

The author describes three new species belonging to the genera *Cladophora*, *Lomentaria*, and *Polysiphonia;* and a new variety of *Bonnemaisonia asparagoides*. Unfortunately these are not figured.

Under the genus *Janczewskia*, Major Reinbold records a species "*J. australis?*" Falkenberg, and refers to a plate and the nomen nudum as occurring on pp. 431 and 432 in Engler & Prantl's Nat. Pflanz. Fam. The only species of Prof. Falkenberg there mentioned is, however, *J. tasmanica*, not *australis*.

E. S. B.

*ARTICLES IN JOURNALS.**

Bot. Centralblatt (Nos. 19, 20).—J. Stoklasa, 'Ueber die physiologische Bedeutung der Furfuroide im Pflanzenorganismus.'—(Nos. 21, 22). L. J. Celakovsky, 'Das Prioritätsgesetz in der botanischen Nomenclatur.' — (No. 22). B. Fedtschenko, 'Über einige *Hedysarum*-Arten.'

Bot. Gazette (15 April).—F. A. Waugh, 'Conspectus of *Lilium*.' W. F. Ganong, 'Appliances for study of Plant Physiology.' — C. J. Chamberlain, 'Oogenesis in *Pinus Laricio*' (3 pl.). — H. C. Cowles, 'Dune Floras of Lake Michigan' (cont.). — J. W. Snow, *Ulvella americana*, sp. n. (1 pl.).

Bot. Notiser (15 May).—G. Lagerheim, 'Ueber die Bestäubungs- und Aussäungseinrichtungen von *Brachyotum lediifolium*' (1 pl.).—A. Nilsson, 'Några drag ur de svenska växtsamhällenas utvecklingshistoria.' — T. O. B. N. Krok, 'Tvänne i Finnmarken återfunna fanerogamer' (*Glyceria reptans* & *Scirpus alpinus*). — O. Nordstedt, '*Nymphæa fennica*.'

Bull. de l'Herb. Boissier (29 April). — J. Bornmüller, 'Zwölf neue *Nepeta*-arten.' — B. Fedtschenko, 'Liste des espèces de *Hedy-*

* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

sarum.' — H. Ross, 'Beiträge zur Flora von Sicilien.' — J. Cardot, 'Flore bryologique de l'Amérique du Nord' (4 pl.).

Bull. Soc. Bot. France, xliv. (Session extraordinaire à Barcelonnette, 1897).—L. Legré, 'Notice sur Jean Saurin' (1647–1724). —H. Coste, 'Quelques plantes de la vallée de l'Ubaye.'

Bull. Torrey Bot. Club (15 May). — L. M. Underwood, 'The genus *Phanerophlebia*' (2 pl.); Id., *Cantharellus multiplex*, sp. n.— E. P. Bicknell, 'Studies in *Sisyrinchium*.' — B. L. Robinson, 'Revision of *Guardiola*.'—A. Nelson, 'New Plants from Wyoming' (*Wyomingia*, gen. nov. = *Erigeron pulcherrimus* Heller).—C. H. Peck, 'Elliot C. Howe' (1828–99).

Erythea (1 May).—W. A. Setchell, 'Notes on *Cyanophyceæ*.'

Journal de Botanique (April). — E. Roze, 'Florule française de Charles de l'Escluse' (concl.).—C. Sauvageau, 'Les *Acinetospora* et la Sexualité des Tilopteridacées.' — P. Van Tieghem, 'Spores, diodes et tomies.'

Malpighia (xiii. fasc. 1, 2). — L. Buscalioni, 'Un nuovo caso di incapsulamento dei granuli di amido' (1 pl.). — M. Pallavicini Misciatelli, 'Nuova contribuzione all' Acarocecidiologica Italica.'— O. Mattirolo, 'Commemorazione di G. Gibelli' (1831–98: portr.). —F. Voglino, 'Di una nuova malattia dell' *Azalea indica*' (2 pl.).

Oesterr. Bot. Zeitschrift (April).—A. v. Degen, '*Rheum Rhaponticum* in Europa.'—V. Schiffner, 'Zur Lebermoosflora von Bhutan' (1 pl.). — E. Hackel, 'Ueber die Gramineen-Gattung *Stapfia*.'— F. Bubák, 'Zur Pilzflora von Tirol.'—V. Folgner, 'Zur Kenntniss der Entwickelungsgeschichte einiger Süsswasser-Peridinien' (1 pl.). — K. Rechinger, 'Über die Trichome der Gesneraceen.' — (April & May). F. Arnold, 'Lichenologische Fragmente.'—K. von Keissler, 'Einige neue Missbildungen' (1 pl.).—(May). C. Hofmann, 'Über *Scolopendrium hybridum*' (1 pl.). — J. Murr, 'Zur Kenntniss der Gattung *Capsella*' (1 pl.).

Rhodora (Feb.). — F. D. Collins, 'Case of Boletus poisoning.'— B. L. Robinson, 'Fairy-rings formed by *Lycopodium inundatum*.'— H. Webster, 'Notes on *Calostoma*.'—M. L. Fernald, *Halenia deflexa* var. *heterantha*.—(March). W. G. Farlow, 'Poisoning by *Agaricus illudens*.' — M. L. Fernald, *Anemone riparia* & *Ranunculus abortivus* var. *eucyclus* (1 pl.). — (April). E. A. Burt, 'Vermont *Helvelleæ*' (1 pl.).—M. L. Fernald, 'Antennarias of Northern New England.' (May). M. L. Fernald, '*Oxytropis campestris* in N.E. America.' G. G. Kennedy, *Pottia Randii*, sp. n. (1 pl.).

BOOK-NOTES, NEWS, &c.

Proceeding much on the lines laid down in Lindberg's *Musci Scandinavici*, Dr. Braithwaite, in the recently published part of his *British Moss-Flora* (Part xix. Feb. 1899. London: 303, Clapham Road. Pp. 65–96; tabb. 97–102. Price 6*s*.), gives us the three remaining species of *Amblystegium* and about half of the genus *Hypnum*, which is divided into the following sections:—*Myurium*, *Sclero-*

podium, *Panckowia*, *Rhynchostegiella*, *Rhynchostegium*, *Brachythecium*, *Pleuropus*. It is in *Rhynchostegium* that the present part ends. *Myurium Hebridarum* Schimp. resumes its original and forgotten name — *Hypnum Hochstetteri* Schimp., which was interred in Seubert's *Flora Azorica* in 1844, and has usually been supposed to be a synonym of—*Berthelotianum* Mont. *Panckowia* represents *Eurhynchium* Schimp., but the history of the name is not given. It appears to be as follows. In 1790 Necker published a natural system of plants in which the Mosses and *Jungermanniaceæ* constituted one genus—*Phryganophytum*, and certain unspecified *Hypna* of Linnæus formed a natural species—*Pancovia* (Elem. Bot. iii. p. 328, n. 1739). However, Necker's natural or omologic system failed to gain acceptance. But in 1867 Kickx (Flore Crypt. des Flandres, i. pp. 75, 91) adopted the name for the genus in which he combined Schimper's *Rhynchostegium*, *Plagiothecium*, *Brachythecium*, and *Eurhynchium*. In 1874 Piré (Revue Bryolog. i. p. 3) modified *Pancovia* by excluding the Plagiothecioid species. And in 1879 Lindberg (Musci Scand. p. 34) reduced it to subgeneric rank, deprived it of all but the Eurhynchioid species, and altered its spelling to *Panckowia*. Dr. Braithwaite's account of *Hypnum prælongum* and its difficult allies will be of great use to British botanists. The synonymy of *Hypnum cirrosum* Schwægr. is instructive. This plant proved so troublesome to Schimper that he distributed it into three genera, four species, and one variety. However, Juratzka and Boulay fitted the fragments together, and decided that it is a single species with three or four well-marked varieties. Another of Schimper's genera which has gone under is the plant *Scorpiurium rivale*, which is now *Hypnum circinatum* var. *deflexifolium*. Dr. Braithwaite records the following additions to our native flora:—*Hypnum meridionale* Schimp., from Somerset; *Hypnum strigosum* var. *præcox* Wahlenb., from Scotland; *Hypnum crassinerve* var. *tenue* Braithw., from Sussex.—A. G.

Mr. M. J. Fernald sends us a reprint of the able and critical review of Dr. Britton's *Illustrated Flora of North America* contributed by him to the *American Journal of Science* for September last. He endorses the important criticisms made by Dr. Robinson on "the so-called Botanical Club Check List" in the *Botanical Gazette* for June last—a paper which, as he truly says, "shows very conclusively that the principles on which the List is based are inconsistent"; and he regrets that "such names as will be only short-lived and which add confusion to the tangle of synonymy" have been used. Mr. Fernald himself contributes examples showing that the "Rochester code" has not been followed in the *Illustrated Flora*, which, however, "in spite of its inaccuracies and inconsistencies is certainly a great convenience."

The note of revolt is also sounded in *Rhodora*, from the May number of which we learn that in the forthcoming "Check List of New England Plants," "specific nomenclature will be determined, at least for the present, by the uniform adoption of the first available name under the genus," the generic names following

the usage of Engler and Prantl. "This combination gives, it is believed, the maximum of definiteness with the minimum of change," We are glad that Mr. B. L. Robinson and his friends are thus adopting the standard which we have always advocated with regard to the specific name. In the specimen list of *Ericaceæ* given, *Calluna vulgaris* "Salisb." must give place, by the application of the rule, to *Calluna Erica* DC. (Fl. Franc. iii. 680 (1805)), as Salisbury gave no specific name to the plant he took as the type of his genus.

It is not only at Kew that difficulty seems to be experienced in filling the Bulletin issued in connection with botanic gardens. In the last Bulletin of the Jamaica Botanical Department for January, February, and March (in one wrapper), thirty-nine of the forty-eight pages are occupied by two papers on "denitrification" reprinted from the Agricultural Society's Journal, the remainder containing a list of presents to the library, and the like. The "botanical" portion is conspicuous by its absence. The volume of the Kew *Bulletin* for 1898 is still unfinished; but the "Additional Series" has just received a weighty addition in the shape of a "Catalogue of the Library of the Royal Botanic Gardens." This we hope to notice in our next issue.

In the April number of the *Bulletin Mensuel des nouvelles publications françaises*, the essay on *Tradescantia* by Prof. A. Gravis, reviewed in our last issue, is classed under "Sciences Médicales."!

Messrs. Lovell Reeve & Co. announce the publication of a new and important work on the *Hepaticæ of the British Isles*, by Mr. W. H. Pearson, to be issued to subscribers for the complete work only, in twenty-eight monthly parts, each with eight plates, price 7s. 6d. coloured; 5s. uncoloured, net.

We learn that "The Proprietors of Nature [we presume the periodical so called is meant] are about to issue a special Reprint of the Third Edition of that well-known work Sowerby's English Botany, to be offered on the instalment system which has recently become so popular. As in the former editions, all the illustrations will be coloured by hand." We trust this does not mean that the illustrations will be coloured by hand as in the last edition, for nothing could well be worse. We hear that Messrs. Warne will reissue at a cheap rate Miss Pratt's *Flowering Plants of Great Britain*. This was a useful book in its time, but Mr. Edward Step, who is to edit the new issue, will find plenty to do if the book is to be brought up to date.

At the anniversary meeting of the Linnean Society on May 24th, the gold medal of the Society was presented to Mr. J. G. Baker, F.R.S., in commemoration of his distinguished services to botanical science.

The first part of vol. ii. of the Catalogue of Welwitsch's African Plants has just been issued. It contains the Monocotyledons and Gymnosperms, which have been elaborated by Mr. Rendle.

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JAMES BRITTEN, K.S.G., F.L.S.,

SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM (NATURAL HISTORY).

CONTENTS.

	PAGE
A New British Freshwater Alga. By A. B. RENDLE, M.A., D.Sc., and W. WEST, JUN., B.A. (Plate 399)	289
The Alga-Flora of Cambridgeshire. By G. S. WEST, B.A., A.R.C.S. (concluded)	291
Bryological Notes from the West Highlands. By H. N. DIXON, M.A., F.L.S.	300
Critical Notes on some Species of *Cerastium*. By FREDERIC N. WILLIAMS, F.L.S. (continued)	310
Remarks on the *Cybele Hibernica*, Ed. 2. By NATHANIEL COLGAN, M.R.I.A., & R. W. SCULLY, F.L.S.	315
Alsine in the British Flora. By W. P. HIERN, M.A., F.L.S.	317
Notes on East Anglian Botany. By ARTHUR BENNETT, F.L.S.	322
SHORT NOTES.—**The Cambridge and Lincoln** *Selinum*.—*Allium Schœnoprasum* L. in Ireland.—*Epipactis atrorubens* Schultes.—*Plantago Psyllium* L.—*Arenaria balearica* in Sussex.—*Hierochloe borealis* in Kincardineshire.	326
NOTICES OF BOOKS:—	
Catalogue of the Library of the Royal Botanic Gardens, Kew ..	329
On *Craterostigma pumilum* Hochst. By H. MARSHALL WARD, D.Sc., F.R.S., and Miss E. DALE ..	332
De Danske Blomsterplanters Naturhistorie. By C. RAUNKIÆR	333
Articles in Journals	333
Book-Notes, News, &c.	334

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THE JOURNAL OF BOTANY was established in 1863 by Dr. Seemann. In 1872 the editorship was assumed by the late Dr. Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

Without professing to occupy the vast field of general Botany, the Journal has from its inception filled a position which, even now, is covered by no other periodical. It affords a ready and prompt medium for the publication of new discoveries, and appears regularly and punctually on the 1st of each month. While more especially concerned with systematic botany, observations of every kind are welcomed. Especial prominence has from the first been given to British botany, and it may safely be said that nothing of primary importance bearing upon this subject has remained unnoticed.

Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains. Many important monographs and other works first appeared in its pages. In 1896 it became necessary to increase its size, owing to the number of papers sent for publication: the number of plates was at the same time augmented.

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A NEW BRITISH FRESHWATER ALGA.

By A. B. Rendle, M.A., D.Sc., and W. West, Jun., B.A.

(Plate 399.)

In the summer of 1896 living plants of *Najas graminea* Del., which has become naturalized in the Reddish Canal, near Manchester, were received at the Museum from Mr. Charles Bailey, who gathered them in the original locality. Attached here and there to the *Najas* were short filaments of a confervoid alga evidently allied to *Cladophora*, but, as the filaments were purely vegetative, determination of the genus was not possible. The *Najas* was put in a large glass jar of water, and kept under inspection. It died down in the winter, and the seeds did not germinate. The alga, however, grew vigorously, and formed a considerable mass of tangled profusely branched light green filaments. Last autumn it was observed to be forming abundance of large dark spores, an examination of which showed it to be a species of *Pithophora*. This genus was founded by Wittrock on a plant which appeared in the water-lily tank at the Royal Gardens, Kew, and the species, *P. kewensis*, was supposed to have come with the water-lilies from the Amazon. He subsequently wrote a monograph of the genus, describing a number of species from different parts of the world. *Pithophora kewensis* has long since disappeared from Kew, but is doubtfully recorded by Wolle (*Freshwater Algæ of the United States*, p. 131) from Florida. Our species shows marked differences from *P. kewensis*, chiefly in having branches of the third degree, and frequently showing several spores aggregated in a moniliform chain. It most nearly resembles Wittrock's figures and description of *P. Oedogonia*, a tropical South American species, a variety of which (*vaucherioides*) occurs in the Northern United States. As the appended table shows, in general measurements the Reddish plant coincides fairly well with *P. Oedogonia*, but the marked aggregation of the resting spores and minor differences have induced us to describe it as a new variety.

The following is Wittrock's description of *P. Oedogonia* (Nova Acta R. Soc. Sci. Upsal. Vol. extraord. edit. 1877, p. 55):—"Principal filament of the cauloid part of the thallus in fertile specimens on an average 70 μ thick, with partly solitary, partly opposite branches of three degrees; subsporal branches rather common; spores usually single, but not rarely in pairs, partly inclosed, partly terminal; the inclosed spores cask-shaped, on an average 114 μ thick and 230 μ long; the terminal spores cask-shaped, with the upper end conical and the top somewhat rounded, on an average 95 μ thick and 214 μ long. Pl. 6, figs. 1–6."

The Reddish plant we describe as *P. Oedogonia* (Mont.) Wittr. var. polyspora Rendle & West fil. It differs from the type in that the spores are rarely single, often in pairs, and not seldom three to seven together. The cask-shaped terminal spores are on an average 150 μ thick and 255 μ long. In some cases the terminal spores

were distinctly cylindrical. The included spores vary greatly, but between approximately the same limits as do those of the typical plant. The branches of the third degree are only about half as thick as those of *P. Oedogonia*.

The appended table speaks for itself; the measurements are given in μ, and are those of fertile specimens:—

	Reddish specimens.		Wittrock's average figures for *P. Oedogonia*	
	Long.	Lat.	Long.	Lat.
Main filament . . . . (crass. membr. 4·7–10·4)	565–580	68–81·5	—	55–90
Branch of 1st order . .	466	52–70	—	50–70
,, 2nd ,, . .	266–303	31–53·5	—	55
,, 3rd ,, . .	70–223	20·5–27·5	—	53
,, ,, ,, (terminal cell) (crass. membr. 2–4·7)	270	25	—	—
Terminal spores:				
Cask-shaped . . .	228–283	146·5–155	160–250	70–115
Cylindrical	191–257	67–91	—	—
Included spores . . .	147–300	96–167	185–320	70–150
Thickness of spore-membrane	2·8——7·5			

Wittrock states that the length of the vegetative cells varies between five and forty-five times the thickness. It was very noticeable that in the Reddish plant the terminal cells of the ultimate branches were the longest, as usual in this genus. One included spore measured only 89 × 100 μ.

Mr. Bailey states that the water in the Reddish Canal at the spot where *Najas graminea* grows is slightly tepid, being warmed by the escape pipe from a factory, and also slightly alkaline from the fact that, owing to the warmness of the water, it is a favourite place for washing dogs. The *Najas* is supposed to have been introduced from Egypt with cotton; at any rate the plants show an anatomical peculiarity which is found also in Egyptian specimens, and which led Magnus to distinguish them as a distinct variety (var. *Delilei*).

No *Pithophora* has yet been recorded from Egypt, or, in fact, any part of Africa.

It is interesting to note that a new *Chara* (*C. Braunii*) was also found in the same locality in the Reddish Canal.

EXPLANATION OF PLATE 399.—Fig. 1. Small portion illustrating mode of branching; the sketch shows branches of the first, second, and third degree with a few included and terminal spores, enlarged. 2. Origin of two branches (*a*, *a*) of the second degree, × 45. 3. Origin of branch of the third degree (*b*), × 212; *a*, branch of second degree. 4. Small portion of branch with two

included spores, enlarged. 5. Detached fragment of fertile branch, × 90; *i*, included spore; *t*, terminal spore; *b*, short sporal branch. 6. Moniliform row of spores. 7. Two sets of three spores, × 55. 8. Terminal and subterminal spores of a sporal branch, × 95.

THE ALGA-FLORA OF CAMBRIDGESHIRE.

By G. S. West, B.A., A.R.C.S.

Scholar of St. John's College, Cambridge.

(Plates 394–396.)

(Concluded from p. 268.)

303. Navicula gracilis Kütz. 2. Dernford Fen, 1 mile S. of Shelford. 3. Sheep's Green, Cambridge; Comberton; Orwell. 7. Sutton West Fen.

Var. neglectum (Thwaites). Syn. *Colletonema neglectum* Thwaites; *Schizonema neglectum* (Thw.) Rabenh.; *Navicula gracilis* var. *schizonemoides* Van Heurck. 3. Ditch, St. John's College "backs," and Sheep's Green, Cambridge; Wimpole Park. 7. Near March; Sutton West Fen.

304. N. viridula Kütz. Syn. *Pinnularia viridula* (Kütz.) Rabenh. 3. Sheep's Green, Cambridge. 4. Histon. 5. Chippenham Fen.

305. N. radiosa Kütz. Syn. *Pinnularia radiosa* (Kütz.) Rabenh. 2. Dernford Fen, 1 mile S. of Shelford. 8. Ditch, St. John's College "backs," Sheep's Green, and Barton Road, Cambridge; Harlton; Hardwick; Comberton; Wimpole Park; Lord's Bridge; 4. Histon. 5. Wicken Fen. 6. Roswell Pits and ponds, near Ely. 8. Guyhirne.

Var. acuta (W. Sm.) Van Heurck. Syn. *Pinnularia acuta* W. Sm. 2. Dernford Fen, 1 mile S. of Shelford. 3. Sheep's Green, Cambridge. 5. Chippenham Fen.

306. N. cryptocephala Kütz. 3. Orwell. 7. Near March; Sutton West Fen.

Var. veneta (Kütz.) Van Heurck. Syn. *N. veneta* Kütz. 3. Ditch, St. John's College "backs," Cambridge. 4. Histon. 7. Sutton West Fen.

307. N. rhynchocephala Kütz. 2. Dernford Fen, 1 mile S. of Shelford. 3. Wimpole Park. 7. Near March.

*Var. amphiceros Van Heurck. 3. Ditch, St. John's College "backs," Cambridge. 7. Sutton West Fen.

308. N. humilis Donk. Syn. *N. inflata* W. Sm. 6. Near Ely.

309. N. lanceolata Kütz. 3. Comberton; Orwell; Wimpole Park. 5. Wicken Fen; Chippenham Fen.

310. N. Gastrum (Ehrenb.) Donk. 5. Wicken Fen.

311. N. tumida W. Sm., 1853. Syn. *N. Anglica* Ralfs, 1861. 2. Shelford.

312. N. DICEPHALA Ehrenb. 3. Ditch, St. John's College "backs, Cambridge.

313. N. ELLIPTICA Kütz. Syn. *N. ovalis* W. Sm. 2. Dernford Fen, 1 mile S. of Shelford. 3. Sheep's Green, Cambridge; Comberton. 5. Wicken Fen; Chippenham Fen.

314. N. TUSCULA Ehrenb. 5. Chippenham Fen.

315. N. PUSILLA W. Sm. 3. Sheep's Green, Cambridge.

316. N. CUSPIDATA Kütz. 2. Shelford. 3. Ditch, St. John's College "backs," and Sheep's Green, Cambridge. 4. Histon. 5. Wicken Fen. 7. In ponds, March. 8. Guyhirne.

317. N. AMBIGUA Ehrenb. 4. Histon. 6. Sutton. 7. Near March.

318. N. SPHÆROPHORA Kütz. 3. Wimpole Park. 5. Wicken Fen. 6. Near Ely. 7. Ponds S. of March.

319. N. EXILIS (Kütz.) Grun. 3. Sheep's Green, Cambridge; Trumpington; Comberton; Lord's Bridge; Wimpole Park. 5. Burwell; Wicken Fen.

320. N. AMPHISBÆNA Bory. 2. Shelford. 3. Ditch, St. John's College "backs," Cambridge; Wimpole Park.

321. N. LIMOSA Kütz. 3. Sheep's Green, Cambridge; Comberton; Orwell; Wimpole Park. 4. Histon. 5. Chippenham Fen. 7. Near March; Sutton West Fen. A figure is given of two auxospores of this species produced by conjugation (Pl. 395, fig. 9).

Var. GIBBERULA (Kütz.) Van Heurck. Syn. *N. gibberula* Kütz. 3. Ditch, St. John's College "backs," and Sheep's Green, Cambridge. 5. Wicken Fen; Chippenham Fen. 6. Sutton.

322. N. IRIDIS Ehrenb. Syn. *N. firma* W. Sm. 5. Wicken Fen; Chippenham Fen.

Var. AMPHIGOMPHUS (Ehrenb.) Van Heurck. Syn. *N. amphigomphus* Ehrenb. 5. Wicken Fen.

Var. AMPHIRHYNCHUS (Ehrenb.) De Toni. Syn. *N. amphirhynchus* Ehrenb. 5. Wicken Fen.

Var. AFFINIS (Ehrenb.) Van Heurck. Syn. *N. affinis* Ehrenb. 3. Sheep's Green, Cambridge.

*323. N. PUPULA Kütz. 3. Sheep's Green, Cambridge; Wimpole Park. 4. Histon. 5. Wicken Fen; Chippenham Fen.

*324. N. ATOMOIDES Grun. 3. Comberton; Wimpole Park.

325. N. GALLICA (W. Sm.) Van Heurck. Syn. *Diadesmis Gallica* W. Sm. 3. Trumpington.

326. VANHEURCKIA RHOMBOIDES (Ehrenb.) Bréb. var. SAXONICA (Rabenh.). Syn. *Frustulia saxonica* Rabenh. 1851; *Navicula crassinervia* Bréb. 1852. 5. Chippenham Fen.

327. AMPHIPLEURA PELLUCIDA Kütz. 3. Sheep's Green, Cambridge; Wimpole Park. 5. Wicken Fen. 8. Guyhirne: very abundant in some ponds by the railway station, Aug. 1898.

328. PLEUROSIGMA ATTENUATUM (Kütz.) Grun. 2. Dernford Fen, 1 mile S. of Shelford. 3. Ditch, St. John's College "backs," and

Sheep's Green, Cambridge; Trumpington; Lord's Bridge; Wimpole Park. 5. Wicken Fen; Chippenham Fen. 8. Guyhirne.

329. P. ACUMINATUM (Kütz.) Grun. Syn. *P. lacustre* W. Sm. 2. Shelford. 3. Ditch, St. John's College "backs," and Barton Road, Cambridge; Lord's Bridge. 4. Histon. 7. Sutton West Fen.

330. P. SPENCERII (Quekett) W. Sm. 3. Ditch, St. John's College "backs," and Sheep's Green, Cambridge; Comberton; Orwell; Wimpole Park. 5. Wicken Fen. 7. Sutton West Fen. 8. Guyhirne.

331. P. PARKERII Harrison. 7. Near March.

332. AMPHIPRORA PALUDOSA W. Sm. 7. In ditches near March.

*333. A. ORNATA Bailey. 7. Ponds S. of March: Aug. 1898.

Fam. GOMPHONEMEÆ.

334. GOMPHONEMA CONSTRICTUM Ehrenb. 2. Dernford Fen, 1 mile S. of Shelford. 3. Ditch, St. John's College "backs," and Sheep's Green, Cambridge; Comberton; Hardwick; Harlton; Lord's Bridge; Wimpole Park. 4. Girton. 5. Burwell; Wicken Fen; Fordham; Chippenham Fen. 6. Roswell Pits, Ely. 7. Sutton West Fen.

Var. CAPITATUM (Ehrenb.) Van Heurck. Syn. *G. capitatum* Ehrenb. 3. Sheep's Green, Cambridge. 6. Near Ely. 7. Sutton West Fen.

335. G. ACUMINATUM Ehrenb. 2. Dernford Fen, 1 mile S. of Shelford. 3. Ditch, St. John's College "backs," and Sheep's Green, Cambridge; Trumpington; Wimpole Park. 5. Wicken Fen; Fordham; Chippenham Fen. 6. Roswell Pits, Ely; Sutton. 7. Sutton West Fen. 8. Guyhirne.

336. G. AUGUR Ehrenb. Syn. *G. cristatum* Ralfs. 3. Wimpole Park. 5. Wicken Fen.

337. G. TENELLUM Kütz. 3. Ditch, St. John's College "backs," and Sheep's Green, Cambridge; Trumpington; Coton; Comberton; Harlton. 4. Girton. 5. Fordham; Chippenham Fen. 6. Near Ely.

338. G. PARVULUM Kütz. 3. Wimpole Park. 4. Girton. 7. Sutton West Fen. 8. Guyhirne.

Var. SUBCAPITATA Van Heurck. 2. Dernford Fen, 1 mile S. of Shelford.

339. G. INTRICATUM Kütz. 2. Dernford Fen, 1 mile S. of Shelford. 3. Wimpole Park.

Var. VIBRIO (Ehrenb.) Van Heurck. Syn. *G. Vibrio* Ehrenb. 3. Sheep's Green, Cambridge; Coton; Comberton; Wimpole Park. 5. Burwell; Chippenham Fen; Wicken Fen. 6. Near Ely. This was very abundant from both Wicken and Chippenham Fens, and sporangial valves were abundant (cfr. Pl. 396, figs. 15, 16).

340. G. ANGUSTATUM Kütz. 3. Wimpole Park. 5. Burwell; Fordham.

341. G. GRACILE Ehrenb. 3. Wimpole Park.

Var. DICHOTOMUM (Kütz.) Van Heurck. Syn. *G. dichotomum* Kütz. 3. Sheep's Green, Cambridge.

342. G. OLIVACEUM (Lyngb.) Kütz. 3. Sheep's Green, Cambridge; Comberton; Wimpole Park. 5. Wicken Fen. 6. Near Ely.

343. RHOICOSPHENIA CURVATA (Kütz.) Grun. Syn. *Gomphonema curvatum* Kütz. 3. Sheep's Green, Cambridge; Comberton. 6. Near Ely. 7. The Washes, Sutton, and Sutton West Fen. 8. Guyhirne.

Fam. ACHNANTHEÆ.

344. ACHNANTHIDIUM FLEXELLUM (Kütz.) Bréb. Syn. *Cocconeis Thwaitesii* W. Sm. 5. Wicken Fen; Chippenham Fen.

345. ACHNANTHES HUNGARICA Grun. 4. Histon. 6. Sutton. 7. Ponds S. of March.

346. A. MICROCEPHALA (Kütz.) Grun. Syn. *Achnanthidium microcephalum* Kütz. 3. Wimpole Park. 5. Burwell; Wicken Fen; Chippenham Fen. 6. Near Ely.

347. A. EXILIS Kütz. 2. Dernford Fen, 1 mile S. of Shelford. 3. Sheep's Green, Cambridge; Comberton; Coton; Lord's Bridge. 4. Girton. 5. Wicken Fen; Fordham; Chippenham Fen. 6. Roswell Pits, Ely.

348. A. LINEARIS (W. Sm.) Grun. Syn. *Achnanthidium lineare* W. Sm. 3. Harlton. 4. Girton. 6. Near Ely. 7. Sutton West Fen; ponds S. of March.

349. A. LANCEOLATA (Bréb.) Grun. Syn. *Achnanthidium lanceolatum* Bréb. 3. Sheep's Green, Cambridge; Comberton; Wimpole Park. 5. Burwell. 6. Sutton. 7. Ponds S. of March.

350. COCCONEIS PEDICULUS Ehrenb. 2. Dernford Fen, 1 mile S. of Shelford. 3. Sheep's Green, Cambridge; Trumpington. 4. Girton. 5. Wicken Fen; Chippenham Fen. 7. The Washes, Sutton, and Sutton West Fen.

351. C. PLACENTULA Ehrenb. 2. Dernford Fen, 1 mile S. of Shelford. 3. Ditch, St. John's College "backs," and Sheep's Green, Cambridge; Trumpington; Comberton; Hardwick; Lord's Bridge; Wimpole Park. 4. Girton. 5. Burwell; Wicken Fen; Fordham; Chippenham Fen. 6. Near Ely. 7. The Washes, Sutton, and Sutton West Fen; near March. 8. Guyhirne.

Order PSEUDO-RAPHIDIEÆ.

Fam. EPITHEMIEÆ.

352. EPITHEMIA TURGIDA (Ehrenb.) Kütz. 3. Sheep's Green, Cambridge: pure gatherings; Hardwick; Wimpole Park. 4. Roswell Pits and ponds near Ely. 8. Guyhirne.

353. E. SOREX Kütz. 8. Guyhirne.

354. E. GIBBA Kütz. 3. Sheep's Green, Cambridge; Wimpole Park. 5. Wicken Fen; Chippenham Fen. 6. Roswell Pits, Ely. 7. March. 8. Guyhirne.

Var. VENTRICOSA (Kütz.) Van Heurck. Syn. *E. ventricosa* Kütz. 8. Guyhirne.

355. E. ARGUS (Ehrenb.) Kütz. 3. Hardwick. 5. Chippenham Fen. 7. Ponds near March.

Var. ALPESTRIS (W. Sm.) Rabenh. Syn. *E. alpestris* W. Sm.; *E. Argus* var. *amphicephala* Grun. 5. Wicken Fen; Chippenham Fen.

356. E. GIBBERULA Kütz. 3. Wimpole Park. 5. Chippenham Fen.

357. EUNOTIA PECTINALIS (Dillw.) Rabenh. Syn. *Himantidium pectinale* (Dillw.) Kütz. 3. Sheep's Green, Cambridge. 5. Wicken Fen; Chippenham Fen. A figure is given showing the reticular structure sometimes exhibited by the cell-contents, owing to the presence of large vacuoles (Pl. 395, fig. 8).

358. E. sp. Valve slightly arcuate, sides subparallel and minutely undulate, apices rounded, slightly subcapitate; striæ 10 in 10 μ; length 106–111 μ (Pl. 396, figs. 12, 13). 5. Wicken Fen, frequent.

359. E. LUNARIS (Ehrenb.) Grun. Syn. *Synedra lunaris* Ehrenb. 3. Sheep's Green, Cambridge; Trumpington; Hardwick; Wimpole Park. 5. Burwell; Wicken Fen; Fordham; Chippenham Fen. 6. Sutton. 8. Guyhirne.

Var. BILUNARIS (Ehrenb.) Grun. 5. Chippenham Fen.

360. E. FLEXUOSA Kütz. var. BICEPS (W. Sm.). Syn. *Synedra biceps* W. Sm.; *Eunotia flexuosa* var. *bicapitata* Grun. 5. Wicken Fen; Chippenham Fen.

Fam. SYNEDREÆ.

361. SYNEDRA PULCHELLA Kütz. 3. Sheep's Green, Cambridge; Comberton; Lord's Bridge; Orwell; Wimpole Park. 4. Histon. 5. Wicken Fen; Chippenham Fen; Burwell. 6. Sutton. 8. Guyhirne.

Var. MINUTISSIMA (W. Sm.). Syn. *S. minutissima* W. Sm.; *S. pulchella* var. *lanceolata* O'Meara. 3. Sheep's Green, Cambridge. 7. Sutton West Fen.

362. S. VAUCHERIÆ Kütz. 3. Coton.

363. S. ULNA (Nitzsch) Ehrenb. 3. Ditch, St. John's College "backs," Cambridge; Comberton; Wimpole Park. 5. Wicken Fen. 6. Near Ely; Sutton.

Var. SPLENDENS (Kütz.) Brun. Syn. *S. splendens* Kütz.; *S. radians* W. Sm. 2. Dernford Fen, 1 mile S. of Shelford. 3. Sheep's Green, Cambridge; Trumpington; Hardwick; Lord's Bridge. 5. Wicken Fen; Fordham. 6. Near Ely.

Var. OXYRHYNCHUS (Kütz.) Van Heurck. Syn. *S. oxyrhynchus* Kütz. 2. Dernford Fen, 1 mile S. of Shelford. 3. Sheep's Green, Cambridge. 5. Chippenham Fen.

364. S. ACUS (Kutz.) Grun. 3. Sheep's Green, Cambridge; Coton; Hardwick; Lord's Bridge; Wimpole Park. 5. Wicken Fen; Chippenham Fen. 6. Roswell Pits, Ely; Sutton.

Var. DELICATISSIMA (W. Sm.) Grun. Syn. *S. delicatissima* W. Sm. 3. Comberton. 5. Fordham. 6. Near Ely. 7. Sutton West Fen.

Var. ANGUSTISSIMA Grun. 3. Wimpole Park. 6. Near Ely. 8. Guyhirne. A peculiar form of this species was observed from Wicken Fen with the median portion of the valve inflated (Pl. 396, fig. 14).

365. S. CAPITATA Ehrenb. 3. Sheep's Green, Cambridge: an almost pure gathering was made in Oct. 1895; Wimpole Park. 5. Wicken Fen; Chippenham Fen. 6. Roswell Pits, Ely.

366. S. RADIANS (Kütz.) Grun. 3. Wimpole Park. 5. Burwell; Chippenham Fen. 6. Roswell Pits, Ely. 8. Guyhirne.

367. S. FAMELICA Kütz. 2. Dernford Fen, 1 mile S. of Shelford. 3. Trumpington, in a ditch. 6. Near Ely.

368. ASTERIONELLA FORMOSA Hass. 5. Wicken Fen.

Fam. FRAGILARIEÆ.

369. FRAGILARIA VIRESCENS Ralfs. 3. Wimpole Park.

370. F. CAPUCINA Desmaz. 2. Dernford Fen, 1 mile S. of Shelford. 3. Ditch, St. John's College "backs," Sheep's Green, and Barton Road, near Cambridge; Harlton; Lord's Bridge; Wimpole Park. 4. Histon. 5. Fordham; Chippenham Fen. 7. Sutton West Fen.

371. F. CONSTRUENS (Ehrenb.) Grun. Syn. *Odontidium Tabellaria* W. Sm. 5. Wicken Fen.

Var. VENTER Van Heurck. 5. Wicken Fen.

372. F. MUTABILIS (W. Sm.) Grun. Syn. *Odontidium mutabile* W. Sm. 3. Sheep's Green, Cambridge; Wimpole Park. 5. Wicken Fen. 7. Sutton West Fen.

Fam. MERIDIONIDEÆ.

373. MERIDION CIRCULARE (Grev.) Ag. 3. Coton. 5. Burwell; Chippenham Fen.

Var. CONSTRICTUM (Ralfs) Van Heurck. Syn. *M. constrictum* Ralfs. 3. Wimpole Park.

Fam. DIATOMEÆ.

374. DIATOMA VULGARE Bory. 2. Dernford Fen, 1 mile S. of Shelford. 3. Ditch, St. John's College "backs," River Cam, and Sheep's Green, Cambridge. 6. Near Ely.

375. D. ELONGATUM Ag. 2. Shelford. 3. Sheep's Green and Barton Road, Cambridge; Trumpington; Hardwick; Lord's Bridge; Wimpole Park. 5. Burwell; Wicken Fen. 6. Roswell Pits, Ely. 7. Sutton West Fen; March. 8. Guyhirne.

376. D. HIEMALE (Lyngb.) Heib. Syn. *Odontidium hiemale* (Lyngb.) Kütz. 7. Sutton West Fen.

377. DENTICULA TENUIS Kütz. 3. Sheep's Green, Cambridge; Trumpington; Wimpole Park. 5. Wicken Fen.

Fam. TABELLARIEÆ.

378. TABELLARIA FLOCCULOSA (Roth) Kütz. 5. Wicken Fen.

Fam. SURIRELLIEÆ.

379. CYMATOPLEURA ELLIPTICA (Bréb.) W. Sm. 5. Ditch, St. John's College "backs," and Sheep's Green, Cambridge; Comberton; Orwell; Wimpole Park. 5. Wicken Fen; Chippenham Fen. 6. Near Ely.

380. C. Solea (Bréb.) W. Sm. 2. Dernford Fen, 1 mile S. of Shelford. 3. Ditch, St. John's College "backs," Sheep's Green, and Barton Road, Cambridge; Comberton; Toft; Orwell; Wimpole Park; Lord's Bridge. 4. Histon. 5. Burwell; Wicken Fen; Fordham; Chippenham Fen. 6. Near Ely. 7. The Washes, Sutton, and Sutton West Fen.

381. Surirella biseriata Bréb. 2. Shelford. 3. Sheep's Green, Cambridge. 5. Chippenham Fen.

382. S. linearis W. Sm. 3. Sheep's Green, Cambridge. 5. Wicken Fen; Chippenham Fen.

383. S. robusta Ehrenb. Syn. *S. nobilis* W. Sm. Var. splendida (Ehrenb.) Van Heurck. Syn. *S. splendida* (Ehrenb.) Kütz. 5. Burwell Load.

384. S. ovalis Bréb. 3. Wimpole Park. 6. Sutton.

Var. angusta (Kütz.) Van Heurck. Syn. *S. angusta* Kütz.; *S. apiculata* W. Sm. 3. Ditch, St. John's College "backs," Cambridge. 7. Sutton West Fen.

Var. pinnata (W. Sm.) Van Heurck. Syn. *S. pinnata* W. Sm. 3. Coton; Orwell; Wimpole Park. 5. Burwell.

Var. minuta (Bréb.) Van Heurck. Syn. *S. minuta* Bréb. 3. Ditch, St. John's College "backs," Cambridge; Wimpole Park.

Var. ovata (Kütz.) Van Heurck. Syn. *S. ovata* Kütz. 6. Sutton.

385. Campylodiscus hibernicus Ehrenb. Syn. *C. costatus* W. Sm. 5. Wicken Fen; Chippenham Fen.

Fam. Nitzschieæ.

386. Hantzschia amphioxys (Ehrenb.) Grun. Syn. *Nitzschia amphioxys* (Ehrenb.) W. Sm. 3. Ditch, St. John's College "backs," Cambridge; Lord's Bridge; Wimpole Park. 4. Histon. 5. Chippenham Fen. 6. Sutton.

387. Nitzschia Tryblionella Hantzsch. Syn. *Tryblionella gracilis* W. Sm. 3. Wimpole Park. 4. Histon. 5. Wicken Fen.

Var. Levidensis (W. Sm.) Van Heurck. Syn. *Tryblionella levidensis* W. Sm. 7. Sutton West Fen.

388. N. constricta (Kütz.) Ralfs. Syn. *N. dubia* W. Sm. 3. Wimpole Park; Orwell. 5. Burwell; Fordham.

389. N. acuminata (W. Sm.) Grun. Syn. *Tryblionella acuminata* W. Sm. 3. Ditch, St. John's College "backs," and Sheep's Green, Cambridge; Comberton; Wimpole Park.

390. N. circumsuta (Bréb.) Grun. Syn. *Surirella circumsuta* Bail.; *Tryblionella Scutellum* W. Sm. 5. Chippenham Fen.

391. N. commutata Grun. 4. Histon. 6. Sutton.

392. N. Denticula Grun. Syn. *Denticula obtusa* W. Sm. 5. Fordham. 6. Near Ely.

393. N. sinuata (W. Sm.) Grun. Syn. *Denticula sinuata* W. Sm. 5. Chippenham Fen.

394. N. dissipata (Kütz.) Grun. Syn. *N. minutissima* W. Sm. 3. Sheep's Green, Cambridge.

Var. MEDIA Van Heurck. 3. Ditch, St. John's College "backs," and Sheep's Green, Cambridge. 5. Burwell.

395. N. PARVULA W. Sm. 1. On damp ground, New Museums, Cambridge. 3. Comberton.

396. N. SIGMOIDEA (Ehrenb.) W. Sm. 2. Shelford. 3. Ditch, St. John's College "backs," and Sheep's Green, Cambridge; Trumpington; Comberton; Lord's Bridge; Wimpole Park. 5. Wicken Fen. 6. Near Ely. 7. Ditches and ponds near March.

397. N. VERMICULARIS (Kütz.) Grun. 3. Ditch, St. John's College "backs," Cambridge.

398. N. CURVULA (Ehrenb.) W. Sm. 3. Trumpington; Lord's Bridge.

399. N. OBTUSA W. Sm. var. NANA Grun. 3. Ditch, St. John's College "backs," Cambridge.

400. N. LINEARIS (Ag.) W. Sm. 2. Dernford Fen, 1 mile S. of Shelford. 3. Trumpington; Coton. 4. Histon. 5. Burwell; Chippenham Fen.

Var. TENUIS (W. Sm.) Grun. Syn. *N. tenuis* W. Sm. 3. Lord's Bridge; Wimpole Park. 4. Histon.

401. N. SUBTILIS Grun. 3. Orwell; Wimpole Park, abundant on damp mud: June, 1898. 7. Sutton West Fen.

Var. PALEACEA Grun. 3. Wimpole Park. 7. Sutton West Fen.

402. N. PALEA (Kütz.) W. Sm. 3. Ditch, St. John's College "backs," Cambridge; Wimpole Park. 5. Chippenham Fen. 6. Near Ely; Sutton. 7. Near March; Sutton West Fen. 8. Guyhirne.

Var. DEBILIS Van Heurck. 2. Dernford Fen, 1 mile S. of Shelford. 7. Sutton West Fen.

403. N. AMPHIBIA Grun. 3. Sheep's Green, Cambridge. 5. Chippenham Fen. 6. Near Ely.

404. N. ACICULARIS (Kütz.) W. Sm. Syn. *Nitzschiella acicularis* Rabenh. 2. Shelford. 3. Ditch, St. John's College "backs," and Sheep's Green, Cambridge; Trumpington.

Order CRYPTO-RAPHIDIEÆ.

Fam. MELOSIREÆ.

405. MELOSIRA VARIANS Ag. 2. Dernford Fen, 1 mile S. of Shelford. 3. Ditch, St. John's College "backs," R. Cam (with sporangia), and Sheep's Green, Cambridge; Trumpington. 4. Girton. 5. Burwell. This plant exhibits epistrophe and apostrophe of the chromatophores.

406. CYCLOTELLA KÜTZINGIANA Chauvin. 3. River Cam at Cambridge, and also many ditches about the town.

407. C. MENEGHINIANA Kütz. 4. Histon. 5. Wicken Fen; Chippenham Fen. 6. Near Ely. 7. Near March, very abundant: Aug. 1898; Sutton West Fen.

408. C. OPERCULATA Kütz. 5. Wicken Fen; Chippenham Fen.

Fam. Coscinodiscideæ.

409. Coscinodiscus lacustris Grun. Syn. *Cyclotella punctata* W. Sm. 8. Wisbeach (*W. Smith*).

P.S.—Mr. H. D. Geldart, of Norwich, has kindly drawn my attention to a somewhat extensive "List of Norfolk Diatomaceæ" by the late F. Kitton in Trans. Norf. & Norw. Nat. Hist. Soc. (1875) iii. 336–354; (1884) iii. 754–770. This I had quite overlooked.

Mr. H. N. Dixon also writes from Northampton that he remembers gathering *Batrachospermum moniliforme* (Roth.) Ag. in a ditch at Cherryhinton, and in springs at source of the brook at Fulbourn (near the Fleam Dyke). This was in 1882. He thinks he also found it at Seven Springs, Shelford."

Explanation of Plates.

a, *a'* = Front view (a fronte visa).
b = Vertical view (a vertice visa).
z = Zoogonidangium.

Plate 394.—Fig. 1, 2. *Bulbochæte ellipsospora*, sp. n. × 260. 3–5. *Œdogonium crassipellitum*, sp. n. × 220. 6–9. *Pilinia stagnalis*, sp. n. × 220. 10, 11. *Radiofilum flavescens*, sp. n. × 520. 12. *Cosmarium protuberans* Lund. forma, × 520. 13. *C. angulosum* Bréb. forma, × 520. 14–17. *Oocystis parva* West & G. S. West, × 520. 18–22. *Ophiocytium cochleare* (Eichw.) A. Br. × 520.

Plate 395.—Fig. 1–3. *Spirogyra pellucida* (Hass.) Kütz. × 220. 4–6. *Mougeotia paludosa*, sp. n. × 520. 7. *Characium* sp. × 520. 8. *Eunotia pectinalis* (Dillw.) Rabenh. × 520. 9. *Navicula limosa* Kütz., auxospore, × 520. 10. *Synechococcus roseo-purpureus*, sp. n. × 520. 11. *Cosmarium Beckii* Gutw. × 520. 12. *C. costatum* Nordst. × 520. 13–16. *Scenedesmus acutiformis* Schröder, × 520.

Plate 396.—Fig. 1, 2. *Closterium peracerosum* Gay, var. *elegans*, var. n. × 520. 3. *C. laterale* Nordst. × 220. 4. *Pleurotænium Ehrenbergii* (Bréb.) De Bary, forma; *a*, × 220; *a'*, × 520. 5. *P. Ehrenbergii* var. ad var. *undulatum* Schaarschm. accedens, × 220. 6. *P. trabecula* (Ehrenb.) Näg. forma *granulata*, × 220. 7. *Cosmarium basilicum*, sp. n. × 520. 8. *Staurastrum paxilliferum*, sp. n. × 520. 9. *Closterium Jenneri* Ralfs, var. *robustum*, var. n. × 520. 10. *Staurastrum Avicula* Bréb. forma, × 520. 11. *Euastrum insulare* (Wittr.) Roy, forma, × 520. 12, 13. *Eunotia* sp. × 740. 14. *Synedra Acus* (Kütz.) Grun. var. × 740. 15, 16. *Gomphonema intricatum* Kütz. var. *Vibrio* (Ehrenb.) Van Heurck. × 520.

BRYOLOGICAL NOTES FROM THE WEST HIGHLANDS.

By H. N. Dixon, M.A., F.L.S.

I spent three weeks of last July in various parts of the West Highlands, the latter half in the company of the Rev. C. H. Binstead. A good deal of time was devoted to collecting mosses, two days' work of especial interest being done in the neighbourhood of Ballachulish. This district has been little worked by bryologists, and as our gatherings proved of some considerable interest as regards moss distribution, I propose to give a short account of the results, together with some notes on points that may be of interest to bryologists gathered in other parts during the same visit.

I had three days in Mull, at Tobermory, but did little collecting, what opportunity I had being principally during an hour or two spent, through the courtesy of Mr. and Mrs. Allan, in the grounds of Aros House, about the Falls. There I gathered *Thuidium delicatulum* Mitt., growing luxuriantly on a large boulder, without fruit, but showing perichætia, with ciliate innermost bracts. I am not sure that this species has been recorded with certainty in Scotland before. It is included as a Perthshire moss by Sadler (Ann. of Scott. Nat. Hist. 1894, p. 20), but the record is based, I believe, upon a herbarium specimen so named, but gathered before the distinction between this and the allied species was well understood, and to establish the record it would be desirable to know that the specimen had been re-examined. There is however no other reason for doubting its correctness, as the species when clearly recognized will doubtless prove to be widely distributed in Scotland, as it has already been found to be in Wales (even to the extent of meriting the term "common"), since first being detected by Mr. Holt at Tyn-y-groes. Indeed, subsequently to gathering it in Mull, I found it three times in Scotland during the same visit, in two distinct localities near Ballachulish, and also near Tyndrum.

At Aros I also gathered *Zygodon conoideus* H. & T., *Hylocomium umbratum* B. & S., and fruiting *Hypnum callichroum* Brid.; while on the moors above, *Sphagnum cuspidatum* var. *plumosum* was found fruiting copiously with *S. subsecundum* var. *obesum*. On rocks near Tobermory I gathered a very starved form of *Bryum*, which appeared to be *B. concinnatum* Spr., though possibly only a starved and altered form of *B. filiforme*.

After leaving Mull I spent a day or two at Spean Bridge Hotel, which I reached, almost wet through, after walking over Ben Nevis from Fort William, to find that my luggage, which was to have been forwarded by rail, had not arrived. This instance—not, as I gathered, absolutely unique—of neglect on the part of the officials of that railway, was more than compensated for by their activity next morning, when the luggage was duly forwarded, and sent, part of it at least, to a station beyond its destination!

There was a good deal of snow on the summit of Ben Nevis, but I was able to examine the edge of the precipitous cliffs on the north side in several places. *Andreæa nivalis* and its var. *fuscescens* were

both seen in considerable quantity, but the two forms appeared to me to intergrade considerably, and I must confess to finding great difficulty, at times, in separating them. A moss which struck me as equally abundant, and which I should probably have selected as the characteristic plant of the summit, was *Webera commutata*, which I do not think has been recorded from this locality; this was growing very freely, and in considerable quantity. There is a specimen of *Webera* in the Kew Herbarium, from Ben Nevis, labelled *W. cucullata*, collected, I believe, by Mitten, which I am inclined to think, from a superficial examination only, is really the above species. The two are much alike in microscopical characters, but, besides the difference in the inflorescence, the leaves of *W. commutata* are markedly toothed above, while those of *W. cucullata* are almost entire; and the areolation of the latter is far wider and laxer than in *W. commutata*.

The ubiquitous *Ceratodon purpureus* was not wanting, at 4400 ft. *Rhacomitrium sudeticum* occurred in very pretty fruiting condition, the capsules being just ripe; the high altitude, apparently, being responsible for a delay of three or four months beyond its recognized fruiting season at lower levels.

A driving mist and rain prevented a systematic examination of the "Red Burn" on the way down, but I gathered *Hypnum molle* Dicks., forming large, soft, intricate sheets in a semi-immersed condition, *Oligotrichum incurvum* var. *laxum* Braithw., and a form of *Philonotis seriata* Mitt. with male inflorescence, having the leaves strongly falcate; such a form, no doubt, as has led to the confusion of this distinct species with falcate forms of ordinary *P. fontana*. Near the "well" at the summit various forms of *Hypnum exannulatum* occur, including the var. *purpurascens*. A marked form of *H. sarmentosum* Wahl. had the leaves bright green, with only a faint tinge of red.

My purpose in visiting Glen Spean was to collect as far as possible on the mountain the southern end of which is known as Aonach Beg, the northern as Aonach Mor. The former enjoys a high reputation from a botanical point of view, witness the paper by the Rev. E. S. Marshall and W. A. Shoolbred in this Journal for March, 1897, to the former of whom I am much indebted for suggestions and other help. In the limited time at my disposal, however, I found myself quite unable to make the necessary arrangements for working the southern end of the mountain, and was obliged to content myself with part of a day on the lower slopes, and one day about the summit of Aonach Mor, the latter only to be reached after a long tramp across an uninteresting and somewhat wearying stretch of moorland. On the former occasion I found practically nothing of interest, a form of *Campylopus Schwarzii* with the leaves somewhat falcate being almost the only moss gathered. On the same ground the next day I gathered *Hypnum stellatum* fruiting in some quantity.

My advice to botanists contemplating the exploration of Aonach Mor would be emphatically that of *Punch* on the matrimonial question. In a somewhat careful search of the cliffs above the small

tarns which lie in the north-east hollow below the summit, at an altitude of close upon 3000 ft., I saw nothing of the comparative richness of vegetation described by Messrs. Marshall and Shoolbred for the southern end of the mountain. That side of the mountain is indeed almost as barren (though of a totally different character) as the summit plateau of Ben Nevis! The one redeeming feature, from a bryologist's standpoint, was the relative abundance of *Polytrichum sexangulare*, which was far finer here than I saw it on Ben Nevis. Forming large masses at the heads of the streamlets issuing from the snow patches just below the summit of the ridge, this rare and distinctively high alpine moss was showing a rich promise of fruit, doubtless for the most part destined to fall a victim to snow and ice before ripening, as is the common fate of this species, on the Continent as well as in the few localities where it is found with us. I gathered specimens five inches high, and as fine as any continental specimens I have seen in our national collections.

I looked in vain for any trace of *Andreæa nivalis*, which might have been expected on a mountain adjoining Ben Nevis, where it is so much at home, and practically 4000 ft. high. The crags, however, close to the summit, and forming the brow of the precipitous side, where it would be most likely to occur, were mostly inaccessible on account of the snow. *Webera Ludwigii* was abundant, and *Philonotis adpressa* Ferg. occurred at the head of the streamlets just below the melting snow; and I gathered *Dicranum molle* Wils. on the summit of the ridge, with the other species of the group which usually occur at this altitude, viz. *D. falcatum* and *D. Starkei*, but absolutely nothing else of interest. The summit itself is more or less covered with *Rhacomitrium lanuginosum*, and one of the numerous forms of *R. heterostichum* var. *alopecurum*. A notable form of *Dicranum molle* occurred, with the habit and falcate leaves of *D. Starkei*, and the nerve distinctly though shortly excurrent; but the basal cells decidedly porose. I have gathered somewhat similar intermediate forms elsewhere, and have no doubt that the two plants, though in their extreme forms very distinct, must be held to be closely allied.

On the 15th I joined Mr. Binstead at Ballachulish, and the same afternoon we had a ramble in the mountain woods fringing the southern shore of Loch Leven. Mr. Binstead had been over this ground during the previous year, finding several rare mosses, and thought it worthy of further search, which the short time we spent there certainly justified. Of those previously gathered by him we found *Dicranum asperulum* Mitt., *D. uncinatum* C.M., *Orthothecium rufescens* c.fr., *Breutelia arcuata* c.fr., and *Hylocomium umbratum* c.fr.; and to these we added *Leptodontium recurvifolium* Lindb., *Thuidium delicatulum* Mitt., *Dicranum Scottianum* c.fr., and *Fissidens osmundoides* with most copious fruit; besides a form of, or allied to, *Weisia curvirostris*, to which reference will be made later.

On the following day we drove part of the way up Glencoe, to explore one of the corries running up into Bidean-nam-Bian, the mountain forming the southern rampart of the Glen. By those

who know the character of Glencoe, the comparatively bare and rocky character of the enclosing hills, it would probably be the last place selected as a likely home of a rich moss vegetation, unless of a distinctly alpine character. Our corrie, however, turned out a most interesting hunting-ground, and its list of rarities was probably by no means exhausted by the few hours' search we were able to bestow, although the area is a very limited one. The bed of a small mountain stream rising near the summit of the Bidean suddenly widens out at about the 1500 ft. level into a flat grassy hollow, doubtless an old lake—or rather tarn—bed ; the foot of this is barred by a huge rampart of moss-grown boulders, under which the stream has to find its way, out of sight but not out of hearing. After a hidden passage of a hundred or two yards, it reappears, and descends for about half a mile to the main stream of Glencoe, through a narrow, precipitous ravine, the sides fringed with trees and clothed with a most luxuriant vegetation of ferns and mosses, the oak-fern being especially fine.

We ascended the ravine from its junction with the main stream, and here found *Hypnum dilatatum* Wils., growing sparingly, *Breutelia arcuata* c.fr., *Thuidium delicatulum* Mitt., and *Leptodontium recurvifolium* growing in considerable abundance, and very fine, being as much as five inches tall. There are two slightly different forms of this very rare moss, one shorter and stouter, and yellowish or brown, found on bare flat surfaces; the other, as here, growing on wet rock ledges among grass and herbage, taller, pale yellowish green, and more slender.

The bed of the stream soon became somewhat impracticable, and we left it and spent the remaining time about the rampart of boulders higher up. These were covered with mosses and hepatics, and dotted here and there with mountain ash, willow and hazel. Here we found again *Dicranum uncinatum* and *D. asperulum* growing luxuriantly, the former in large tufts sometimes six inches deep. *Dicranodontium longirostre* sometimes accompanies *D. asperulum* in these localities, and the two are then very difficult to separate with the lens alone. The leaves in the *Dicranum* are deciduous, as in the more common species. There were also *Plagiothecium striatellum* Lindb., in good fruiting condition ; *Antitrichia* and *Breutelia*, in fruit; *Cynodontium polycarpum*, *Glyphomitrium Daviesii*, and the rare hepatic *Mastigophora Woodsii*, growing in large deep tufts, attaining a length of nine inches and even more.

The chief feature of the moss vegetation, however, was the great wealth of *Ulotæ*. All our arboreal species were seen (*U. crispula*, should this be reckoned a species, alone excepted) ; and it is quite possible that, had search been made, the only remaining British (rupestral) species, *U. Hutchinsiæ*, might have been added. Some idea of their abundance may be gathered from the fact that on one willow-stem were found together *U. Drummondii*, *Ludwigii*, *calvescens*, *Bruchii*, *crispa* (aggregate) and *phyllantha*, a record in *Ulota* which I venture to think will take a good deal of beating ! The presence of *U. calvescens* was one of the most interesting features of the locality. Mr. Binstead had already found it, the previous

year, in another spot in Glencoe, and here it was growing freely, though not abundantly, and evidently in congenial surroundings. It was noticeable that the capsules were in a distinctly more advanced stage of maturity than those of its near allies, *crispa* and *Bruchii*, so that the time of ripening might safely be placed a month earlier. The capsules, too, are usually less freely produced, rather more longly exserted, and of a distinctly firmer texture and richer, deeper colouring; so that it can be known even without the characteristic calyptra. The peristome teeth appear to be inserted more within the mouth of the capsule than in these species.

The presence of some of these mosses naturally suggests a comparison with the flora of the south-west of Ireland. It is certain that in no other part of these islands (or indeed of Europe) but the neighbourhood of Killarney could the *Mastigophora*, *Leptodontium*, *Ulota calvescens*, *U. Ludwigii*, and *U. Drummondii* be found growing in close juxtaposition. The sheltered situation, the mildness and humidity of the atmosphere, and the influence of the Gulf Stream, doubtless tend to render the climate of this, as well as other parts of the west coast of Scotland under similar local conditions, as well as in a less degree that of Norway, closely akin to that of the south-west of Ireland; and this is fully borne out by the very interesting additions recently made to our knowledge of the Hepatics of the west coast of Scotland by Mr. S. M. Macvicar, in which are included several species hitherto altogether or almost entirely confined to the Killarney district of Ireland or one or two spots on the Norwegian coast.

The two distinct and primary factors which go to make up the climatal conditions of vegetation in the West Highlands were curiously illustrated here, since side by side with these shade- and moisture-loving and one would suppose somewhat tender species, which were growing so freely and luxuriantly as to afford ample evidence of their congenial environment, were found several distinctly alpine mosses, notably *Dicranum falcatum*, *Dicranoweisia crispula*, and *Plagiothecium striatellum*.

The remainder of our visit was spent at Tyndrum, in part for the purpose of exploring one or two of the hills at the western extremity of the Breadalbane range. A few of these, as Ben Chalum and Creag Mhor, have received considerable attention from bryologists, but the greater number of lesser peaks have been much neglected, partly as being difficult of access, partly no doubt suffering from the rival attractions of the Ben Lawers group. We paid two visits to Ben Douran, and I had a few hours on Ben Heasgarnich; Ben Odhar we had visited the previous summer, with disappointing results. I do not know of any previous bryological records from these three mountains. Their moss-flora is, on the whole, very similar to that of others of the group, such as Meall Ghaordie, Ben Chalum, &c.; still some plants of considerable interest were collected, and it is quite possible that a search of some of the other little-known summits might afford fresh and equally noteworthy discoveries. In this small group there are, within a radius of four miles, at least eight distinct mountains attaining

3000 ft. or more, besides several only slightly lower ones, all composed more or less of that friable mica schist to which in a great part at least is owed the richness of the flora, and pre-eminently of the moss-flora, of this district. And the greater number of these, as far as I am aware, are to bryologists still virgin soil.

After gathering *Plagiothecium Müllerianum* Schp., near Killin, in 1897, I was naturally on the look-out for it, and had the satisfaction of finding it in three or four fresh localities, *viz.* Ben Lui, Ben Heasgarnich, Craig Chailleach, and Ben Douran.

It was much the same with *Thuidium Philiberti* Limpr. Not only did we come across it in some quantity on Craig Chailleach, where I first gathered it in 1893, but it occurred also on Ben Chalum, while on Ben Lui it is the prevailing *Thuidium*, and quite abundant. On the last-named mountain *T. delicatulum* Mitt. was also detected. There is some considerable degree of variation in the three closely allied species, *recognitum*, *Philiberti*, and *delicatulum*, as regards some of the vegetative characters, such as the degree of pinnation, the length of nerve in the stem-leaves, and the recurving or otherwise of their margins; and though these are not unfrequently confidently relied upon to provide specific distinctions, and are even employed as test characters for artificial keys, I am confident that they are unreliable as such. Without doubt, the branching in *T. recognitum* and *T. Philiberti* is almost constantly bipinnate, that of *T. delicatulum* tripinnate; yet luxuriant specimens of the former are certainly occasionally tripinnate, while the reverse is not unfrequently the case with *T. delicatulum*. There is, however, a very useful character to be derived from the position of the stem-leaves, which Dr. Best points out in his *Revision of the North American Thuidiums*, and which has not, I think, been distinguished in European works on the subject. In *T. tamariscinum* and *T. delicatulum* the stem-leaves are very similar, and in the moist condition the comparatively short and gradually narrowed acumen is erect or even almost appressed to the stem, at the most somewhat erecto-patent; and this position is little altered when dry, though the acumen, especially in the longer leaves, becomes flexuose, and, occasionally only, slightly recurved. In *T. recognitum* and *T. Philiberti* the leaf is more abruptly narrowed into a usually much longer, almost ligulate or loriform acumen, which is widely spreading and towards the apex recurved in the moist state, and when dry usually very strongly reflexed. This is especially noticeable at the apex of the growing stem, where the leaves are frequently turned to the lower side, and may then present the falcate or subcircinate condition that one sees, for instance, in the analogous leaves of *Hypnum molluscum*.

I was a little surprised to find *Orthothecium rufescens* fruiting freely in several localities. I had always looked upon it as a rare fruiter, which doubtless in the main it is; but we saw it fruiting in some quantity in three distinct localities, *viz.* Ballachulish, Tyndrum, and Ben Lui. Nor was it an unusual occurrence induced by a peculiarity in the season, for in all cases old capsules and setæ were present.

A stream near Tyndrum yielded several interesting plants, the *Orthothecium* c.fr., *Hypnum stellatum* var. *protensum* c.fr., *H. eugyrium* var. *Mackayi*, *Isothecium myurum* var. *robustum*. Also one or two forms of *Dichodontium*, which, with the *Weisia* (*Hymenostylium*) before mentioned, deserve fuller treatment, and must not be dealt with here.

Ben Douran (Beinn Doireann), which is in Argyllshire, is easily accessible from Tyndrum, and still more so from Bridge of Orchy Station. There is a good deal of broken rock and corrie near the summit and on the northern side, which would probably repay a more careful search than we were able to give. A couple of hours spent on the southern shoulder without gaining any great altitude, afforded *Plagiothecium striatellum* Lindb., and *Cynodontium polycarpum* var. *laxirete* Dixon, making the second locality for this last very marked variety.

On the 23rd we ascended from Bridge of Orchy Station, striking due east for the gap between Ben Douran and Ben an Dothaidh, and then following up the stream which rises near the summit in a series of springs and pools filling a slight hollow at about 3000 ft., where it was evident the snow had not long disappeared. Barren as this part of the mountain is of flowering plants, we found here some interesting mosses, among them being various forms of *Hypnum exannulatum*, with which some of the pools were almost filled. The most prominent was a fine submerged form of the var. *stenophyllum* Hobk., (Group *Rotæ*, var. *falcifolium* Ren.). Another noticeable form, and quite distinct from this, was one referable to the var. *brachydictyon* Ren., and very near the *forma orthophylla* of the same author; this was on the drier spots by the margin of the pools. Immense masses of *Hypnum sarmentosum* filled some of the springs, with here and there a capsule, somewhat immature, but welcome in such a rare fruiter. A single capsule in mid-bog would lure one on to destruction—of clothing and comfort at least—frequently to prove when gathered only a supposititious child of *H. revolvens*, which has a nasty habit of growing in company with *H. sarmentosum* and palming off its capsules upon it.

One of the most interesting plants we gathered here was a floating form of *H. trifarium*, some of the stems collected being as much as a foot in length, without a branch. The moss may be gathered on many of these mountains, usually in some such spot as where a bog is attempting, with indifferent success, to pose as a stream; but, however good the specimens in such habitats may look *in situ*, they mostly disappoint in the fruition, and rarely make neat herbarium specimens; here, however, clean and unbroken specimens could be obtained without much difficulty, eight or nine inches long, and even more.

Plagiothecium Müllerianum was found in very good condition on crags quite low down, and again at the very summit. *Webera annotina* was fruiting well, if not abundantly, often mixed with *W. Ludwigii*. A curious form of *Leptodontium flexifolium* was deeply tinged with red, and many of the leaves, especially the older ones, showed a very clearly defined marginal band of two or three rows

of pale or reddish cells, at times quite as marked as in *L. recurvifolium*, though in other leaves quite wanting. *Hylocomium pyrenaicum* was found, but in very small quantity and poor condition.

At or about the summit, all our five species of *Dicranum* of the Section *Arctoa* were found, including *D. molle*, Wils., and the rare *D. schisti* Lindb. In the uppermost springs of the brae which forms the western side of the mountain, *Philonotis seriata* was found in very good condition, but the inelastic conditions imposed by railway time-tables on modern botanizing prevented search for specimens with perigonia or fruit.

A visit to Ben Chalum afforded a new station for *Aulacomnium turgidum* somewhat low down on the grassy south-western slope, quite a different part of the mountain from that on which Mr. Binstead had detected it many years before. By a curious coincidence it had been found, not three weeks earlier, on the very next mountain, Ben Dheiceach, by Mr. R. H. Meldrum; it has now been gathered in at least five distinct stations in Perthshire, and it is not at all improbable that it may turn up in others; for when growing, as it was here, half hidden among herbage on comparatively low grassy slopes—that part of a mountain which perhaps least of any is likely to tempt search on the part of a bryologist—it is very far from being a conspicuous plant, however much it may be when forming a patch by itself, as is sometimes the case. A careful and systematic search of Rannoch Moor is, by the way, strongly to be recommended to any bryologist suffering from too sedentary a life; it would assuredly provide exercise, without undue excitement, and probably would add to the known stations of the *Aulacomnium*, while it might very conceivably restore to us *Paludella squarrosa* as a constituent of our moss-flora.

Hypnum arcticum was fruiting freely in this, the best known of its few British stations; *Thuidium Philiberti* was there in some quantity, as also *Plagiothecium striatellum*, rarely absent from any of this group of hills where the summit is at all strewn with boulders. *Hypnum molluscum* var. *condensatum*, *Barbula rubella* var. *ruberrima*, *Cynodontium polycarpum*, *Dicranum fuscescens* var. *congestum*, and a *Campylopus*, which, though showing passably well-marked auricles to the leaves, was certainly nearer to *C. Schimperi* than to *C. Schwarzii*, were other plants of interest.

A few hours at the head of Loch Long on another day were devoted by me to a search for *Plagiothecium Müllerianum*, in the spot on Ben Narnain where it was previously gathered, though at the time unrecognized, by Mr. James Murray. The search was unsuccessful, but a barren *Bryum* was found, which Dr. Cardot informs me he cannot refer to any known species, and is therefore about to describe as new. In addition to this, *Cynodontium polycarpum*, *Bryum Mildeanum*, *B. filiforme* c.fr., *H. molluscum* var. *condensatum*, and *H. stellatum* var. *protensum* c.fr. were the most interesting mosses seen. Returning the same afternoon to Tyndrum by Loch Lomond, I planned a short exploration of the lake-shore near Tarbet. I found, however, I was reckoning without my hosts—of midgets—and was constrained to beat a speedy retreat, having seen

nothing but *Grimmia Hartmani*, *G. subsquarrosa*, and *Ulota Hutchinsiæ*.

The large boulders which so often line the shores of our Scotch lakes, as well as those of the English Lake District, are frequently the home of a short dark-green *Grimmia*, growing in undefined patches, with a sort of unfinished appearance, which, doubtless, is the cause that bryologists usually pass it by, probably as an undeveloped *Rhacomitrium*, or form of *G. trichophylla*. Immersion in OH_2 and microscopical examination show it to be *G. subsquarrosa*, which can certainly no longer be considered a very rare plant with us. Mr. Binstead has found it around several of the English lakes, and I can testify to its presence by Lochs Lomond, Katrine, and Tay. I can see no good reason for considering it, with Limpricht, a form of *G. Mühlenbeckii*.

A day on Craig Chailleach was not to be expected to reveal novelties, but the riches of this group of hills seem to be inexhaustible. *Plagiothecium Müllerianum* was found near the summit of the ridge—the previous station, where I gathered it in 1897, was at the foot of the mountain. *Fissidens bryoides* and *Thuidium abietinum* occurred at 2750 ft., the latter showing the tetracladous branching in a most striking manner. *Plagiobryum demissum*, we were glad to see, was still to be found, over some considerable area, with *Myurella apiculata* here and there in close company. A moss which had all the appearance of a green-brown form of *H. revolvens* (such as *H. intermedium* Lindb.) growing in flattish cushions on wet sloping rocks near the summit, and which was indeed gathered somewhat shamefacedly and brought home as a mere form of that common plant, turned out to be *H. Bambergeri*. As is not unfrequent with pleurocarpous mosses growing in this form of cushion, the stems at the border of the patch were more pinnately branched than the more central stems, thus departing somewhat from the typical character of *H. Bambergeri*, which is usually more or less fastigiate in its branching. This has led more than once to specimens of this moss being wrongly determined.

By far the most interesting moss, however, was a *Bryum* gathered on the bare stony soil at the summit of the ridge, at about 3300 ft. The stems were gregarious rather than tufted, the foliage of a bright purple colour; the capsules, almost mature, were of a pale yellowish brown, small, oblong-pyriform with a distinct neck, and usually slightly incurved and therefore unsymmetrical, on rather short setæ. Microscopical examination showed the peristome to be imperfect, and taken together with the structure of the leaves, the large spores, &c., to indicate something quite different from any of our recognized British species, of which *B. purpurascens* B. & S. appeared to approach it most nearly. Comparison of descriptions seemed to point to *B. arcticum* R. Br., and this determination was confirmed by Drs. Braithwaite and Cardot. At the suggestion of the latter I sent it for confirmation to Philibert, who fully endorsed the naming. The following is an extract from his letter:—"Le premier, que vous rapportez au *Bryum arcticum*, appartient bien certainement à cette espèce; il en a tous les caractères,

soit du système végétatif, soit du péristome ; je ne vois pas d'ailleurs que sous aucun rapport il diffère plus des autres variétés du *B. arcticum*, trouvées soit dans les Alpes et le Jura, soit en Norvège, que ces diverses variétés ne diffèrent entre elles."

Bryum arcticum is a very interesting addition to our Moss-flora, being quite above suspicion as to its specific value. It is extremely variable, and many of its races have been elevated to specific rank, to which the term subspecies would certainly be most applicable. It belongs to the Section *Ptychostomum*, but the markings on the inner face of the outer peristome teeth are far less numerous and distinct than in *B. pendulum* and *B. Warneum*. Hence at first sight the peristome appears to belong to the Section *Cladodium*, as in *B. inclinatum*, and it needs careful focussing under a high power to bring out the real character. For a detailed account of the peristome in this species the reader must be referred to the articles by Philibert in the *Revue Bryologique*, &c. The high alpine character of the moss and its general features will prevent its being confused with any of our species, except perhaps *B. purpurascens*, which has indeed been considered by several authors as a variety of *B. arcticum*. The peristome of *B. purpurascens* is, however, more truly that of *Cladodium*, the fine papillæ of the dorsal (outer) surface of the peristome teeth have a tendency to be arranged in horizontal rows, causing a very finely striate appearance; and the capsule is usually more regular and symmetrical.

As the name implies, *B. arcticum* is a boreal species, descending into Central Europe only as an inhabitant of the higher parts of the Alps, Jura, &c.

We paid one visit to Ben Lui, confining our search, however, to but a small portion of the fine crags on the western side, and without ascending higher probably than 2500 ft. Although this mountain has been so well worked, I have little doubt that further search would yield mosses that have not yet been detected; it is certainly one of our finest mountains as far as favourable conditions for moss-life are concerned. One has only to find out, after some hours' careful search, how little space one has actually covered, to realize the extent of really fine ground that Ben Lui presents.

In the small area of crag worked by us we collected, among other good mosses, *Plagiothecium Müllerianum*, *Seligeria recurvata*, *Orthothecium rufescens* (in good fruit), *Thuidium delicatulum*, *T. Philiberti* (growing luxuriantly and indeed in abundance); and a *Weisia* (*Hymenostylium*), before referred to, which is still *sub judice*, but which at the least is a well-marked and undescribed variety of *W. curvirostris*.

Just before we left Tyndrum Mr. G. C. Druce came on a short visit, and I had the pleasure of visiting Ben Heasgarnich in company with him and a friend. Ben Heasgarnich is not a mountain with which the ordinary tourist is permitted to become too familiar; indeed, there is a certain stand-offishness about it that renders it far from being easily approachable. Even with the help of a trap so far as the road served us, it was a long tramp and a somewhat wearisome one to the foot of the mountain on the shore of Loch

Lyon; nor did the prospect of a comfortable hotel and a good dinner appreciably shorten the ten miles tramp home (minus the trap) over "bog-myrtle and peat." On reaching the shoulder of the mountain, while my companions rejoiced their hearts with *Carex ustulata*, I searched some part of the crags which form a bold escarpment on the northern side, reaching the summit, which, however, is bare and uninteresting. The short time I had among the crags yielded *Timmia norvegica*, *Plagiothecium Müllerianum*, *Hypnum trifarium*, *Cynodontium virens*, *Webera Ludwigii* c.fr., and *W. albicans* var. *glacialis* c.fr., which certainly suggest that a prolonged search, if practicable, would be well repaid. *Tetraplodon mnioides* and *Splachnum sphæricum* were found growing in one tuft, the former in more abundant and crowded fruit than I have ever seen it, good fruiter though it be.

Besides the species mentioned in this article, we gathered numerous commoner plants which are probably new records for one or other of the vice-counties concerned; but as these will find a place in the census of distribution upon which Mr. E. C. Horrell is engaged, no good purpose would be served by giving the list here. I may add that I have duplicates of most of the plants referred to in this article, and shall be pleased to send any of them to any bryologist who may care to have them.

CRITICAL NOTES ON SOME SPECIES OF *CERASTIUM*.

By Frederic N. Williams, F.L.S.

(Continued from p. 216.)

96. C. DICHOTOMUM Schangin, Beschr. Min. Botan. Reis. Altaïsch. in Pall., Neue Nord. Beitr. vi. 93 (1793–96); Ledeb. Fl. Rossica, i. 401: = *C. Davuricum*. I have not been able to refer to Schangin's memoir, as there is not a copy of this publication in Herb. Mus. Brit. or Herb. Kew.

97. C. DICROTRICHUM Fenzl, ex Rohrb. in Mart. Fl. Brasil. xiv. pt. ii. 281 (Feb. 1872). At the time of preparing the provisional list of the species of *Cerastium*, I thought that this plant might be identical either with *C. Ripartianum* or *C. nutans*, but a re-examination of authentic specimens collected by A. F. Regnell in 1862 shows many points of difference from these two species. The original description here given is verified and slightly modified from an examination of these authentic specimens. Rohrbach, in his subsequent reference to the plant in *Linnæa*, xxxvii. 291, while comparing it with *C. nutans*, notes the fragile stems invested with both simple and stellate hairs, the petals with acute lobes, the very long styles, and the form of the seeds.

Caules fragiles, decumbentes, valde ramosi, ramis erecto-subpatulis, inferne teretes, superne angulati, pilis simplicibus apice glandulosis dense vestiti, 45 centim. alti. Folia anguste lanceolata

longe acuminata sessilia, pilis brevibus plerisque apice bi- vel tripartitis vel rarissime simplicibus scabriuscula, inferiora 25–40 mm., superiora sensim minora. Flores in dichasiis multifloris, ramis valde divergentibus et superne mox in cincinnos transmutatis (floribus nonnullis alaribus abortu); pedicelli fructiferi centrales calyce æqui- vel sesquilongiores, alares calyce vix duplo longiores, densius glanduloso-pubescentes, capsulam nutantem ferentes; bracteæ herbaceæ parvæ ovatæ etiam dense pilosæ. Sepala oblonga subobtusa anguste scariosa sparsim glanduloso-pubescentia. Petala calyce sesquilongiora biloba, lobis acutis, ungue glabra. Filamenta glabra. Styli prælongi. Capsula calyce duplo longior, dentibus subobtusis erectis. Semina fusca, dorso lato leviter obtuse canaliculata, faciebus plana, obtuse granulata (in capsula centrali mediocri 6).

β Pohlianum Fenzl, *l. c.* Caules sæpe laxissimi valde fragiles. Flores paullum majores 5–6 mm.; petala paullum longius exserta. Capsula calyce fere triplo longior.

Hab. Brazil; in the Campos Geraës district of prov. of São Paulo,—var. *β*, near the town of Caldas, over the border of the neighbouring prov. of Minas Geraës (*Regnell*, Herb. Brasil. no. iii. 266, *Pohl*), and Serra do São Bento, in prov. of Sta. Catharina (*Regnell*).

Cambessédes' original specimens were mistaken by him for the previously known *C. Commersonianum*, from which they differ in the indumentum, inflorescence, calyx not campanulate, and other characters. Placing Regnell's specimens side by side with those of *C. nutans*, they are readily distinguishable.

98. C. diffusum Pers. Syn. Plant. i. 520 (1805); DC. Prodr. i. 417; ? *C. tetrandrum* Curtis. Founded on Thibaud's specimens, doubtfully stated by Persoon to have been collected in Scotland. Seringe gives a somewhat longer diagnosis, based on these specimens in herb. DC., which he examined. He says that it is a plant with the habit of *Arenaria spathulata*.

99. C. Dinaricum Beck & Szyszyl. in Rozpr. Akad. Umiej. Wydz. Matemat. Przyod. Krakow. xix. 62, t. 4 (1889). Syn. *C. latifolium* (non L.) Vis. in Mem. Real. Istit. Venet. xvi. 163 (1871). *C. alpinum* (non L.) Panc. Elench. pl. Crnagora, 15 (1875). Sepala margine anguste scariosa æque ac *C. latifolio* et *C. alpino*. Folia lanceolata.

No specimens in Herb. Kew.; but the specimens I examined in Herb. Zürich seemed quite distinct from *C. alpinum* and the narrower-leaved forms of *C. latifolium*. By Gürke placed between *C. alpinum* and *C. triviale*.

Hab. Montenegro, and the Dinaric Alps of the province of Dalmatia.

100. C. dioicum Soland. in Aiton, Hort. Kew. (ed. 1) ii. 120 (1789); Fenzl, Verbreit. Fam. Alsin. t. ad p. 56 (1833); Gren. Monogr. 84 (1841) ("species non satis notæ"). The short original description is, "Hirtum, viscidum, foliis lanceolatis, floribus dioicis, petalis calyce triplo majoribus." It was cultivated in the Oxford

Botanic Garden in 1766. Aiton does not state the source of the plant which supplied seeds for the cultivated plant. There is, however, an authentic specimen, about 16 centim. long, in Herb. Kew.; and this is labelled "Gibraltar." From a careful examination of this interesting specimen, after placing it by the side of others, and comparing them, I believe it to be a diœcious state of *C. Gibraltaricum*. Being a cultivated form, the name cannot, therefore, supersede the latter.

101. C. DIVARICATUM Herbich, in *Flora*, vii. 184 (1824). Overlooked in Grenier's monograph, and not mentioned by Nyman. By Gürke placed among the "species dubiæ vel non satis notæ." Herbich says that he found the plant in the Valle di S. Rocco, in the prov. of Campania, and growing close at hand was *C. glomeratum*. The diagnosis is in German, and the following is a Latin rendering of the points of divergence from this common species:—Glaucum, pilis brevioribus rarioribus transversis vestitum, haud viscidum, magis divaricatum; folia subfloralia margine haud membranacea; pedicelli fructiferi calyce multoties longiores, basi haud refracti. So that it seems rather to be a form or state of *C. triviale*. It is not mentioned in Grenier's monograph, nor is it referred to by Tanfani in Parlatore's *Flora Italiana*. If it were a well-marked form, it would surely be noticed by Tenore in one or other of his numerous contributions to the Neapolitan flora.

102. C. DREGEANUM Fenzl in Ann. Wien. Mus. i. 341 (1836). *Ic.* Gren. Monogr. Cerast. t. 6 (*C. brachycarpum*). Named after the Dutch botanist who collected so assiduously in South Africa. Seems nearest to *C. brachypetalum*, a Mediterranean species.

Hab. Natal: between the rivers Klip and Kat, in the Klip River district, and on the Lostafelberg, in the Drakensberg Mtns. (a smaller form). Basutoland: west slopes of Orange Kloof (*Dod*, Fl. Cape Peninsula, n. 3503, Oct. 1897). Cape Colony: Baziyaberg, in Kaffraria (*Baur*, Fl. Transkeiana, n. 500, Oct. 1884).

103. C. DUBIUM Guépin, Fl. Maine-et-Loire, 267 (1830): = *C. anomalum*. Previously referred to as *Stellaria dubia* Bast. Fl. Maine-et-Loire, suppl. 24. There is no copy of this flora in Herb. Kew., neither is the name taken up in *Index Kewensis*.

104. C. DURIÆI Des Moul. ex J. Gay (solùm nomen) in Ann. Sc. Nat. ser. II. vi. 348 (1836) (RIÆI). A species founded on Durieu's *Pl. sel. Hisp. Lusit.* no. 394, collected in flower and fruit 15 July, 1835, on the mountains of Asturias, near Puerto de Leitariegos. On the label attached to Gay's type-specimens in Herb. Kew. is the citation, "*Desm.* in Act. Soc. Linn. Bord. viii." (published in 1836). In what Des Moulins subsequently wrote as to the discovery of the plant, and the priority of the specific name, there is no mention of this earliest publication, which he would certainly have drawn attention to in combating the claims of Boissier's *C. ramosissimum*, a plant collected by him on Sierra Nevada, to supersede Durieu's plant from the Pico de Arvas, in the mountains of Asturias. He intended, no doubt, to publish a description of the plant in a future livraison of the work mentioned

on the label, but did not carry out his intention, relying on the sufficient publication implied in the distribution of Durieu's *Exsiccatæ*. Des Moulins refused to write his name "Desmoulins," as more frequently found in references, and in like manner preferred to write Durieu's name incorrectly as "Du Rieu." St. Lager (*Etude des Fleurs*) very properly proposed that as the specific name was imposed on the plant in honour of Durieu, the least that the author could do was to spell it in the usual form assumed by its owner. I have therefore acted on St. Lager's suggestion, and dropped "Riæi" in favour of "Duriæi," which at once identifies the plant with the collector.

The seeds of this species are not accurately described in floras. An examination of some of the seeds in a capsule from the type-specimens show the following characters:—Smaller than in most species, one-third the size of those of *C. dichotomum*, the testa not crumpled or ridged but closely applied to the nucellus, reniform, rust-coloured but finally a darker brown, at the margin slightly concave edged with muricate tubercles, at the sides covered with slightly raised granules in concentric series. Algerian specimens labelled "*C. Atlanticum*" in herbaria, which I have examined, certainly seem to belong to this species, and thus extend the range of *C. Duriæi* into North Africa. As there has been confusion in the comparison of specimens referred to this species, I have here described the species from the original specimens, omitting characters common to the subsection in which it is placed.

Monotocum, pilis patentibus glanduloso-hirsutis dense vestitum, arenæ granulis tectum, viscosum, pumilum, divaricatim perramosum, plerumque 7–10 centim. Folia sessilia, ovalia lanceolata vel linearilanceolata, obtusa. Cymæ fastigiatæ dichotomæ; flores numerosi, in dichasium 11–14 florum dispositi; pedicelli calycem æquantes vel eo breviores, post anthesin basi refracti, fructiferi demum iterum erecti; bracteæ omnino herbaceæ. Calyx basi subumbilicatus truncatus; sepala pilis sparsis rigidis hispida, apice haud barbata, dorso nervato-carinata, oblongo-lanceolata subacuta subpellucida, 2 exteriora omnino herbacea, reliqua anguste scariosa. Petala obovato-cuneata breviter bidentata, sinu rotundato, interdum carnea, calyce dimidio breviora, vel etiam $\frac{1}{3}$ breviora, sæpe abortientia vel in summis floribus omnino deficientia. Stamina 10; filamenta glabra, antheræ globoso-ellipsoideæ flavæ. Capsula longe tubulosa gracilis apice leviter curvula, calyce circiter duplo longior. Semina reniformia primum ferruginea demum fusca, nucellum arcte includentia, dorso conspicue muricata, faciebus granulato-tuberculata, $\frac{1}{3}$ eorum *C. dichotomi* tantum adæquantia, seriebus granulorum concentricis (in fructu centrali 7).

Geogr. Area. France: dept. of Lozère, rocks in the forest of Villeneuve, nr. Mende; dept. of Gard, granitic soil at Bonheur, nr. l'Espérou, and at Puéchagut, nr. Le Vigan, Montels, Mt. Saint-Guiral, and at Aumessas.—Spain, in sandy and gravelly places on the rocky slopes of mountains: in prov. of Asturias, Pico de Arvas, above Puerto de Leitariegos (the original type-specimens described above), valley of Naviegi, on the Pico de Canellas; prov. of New

Castile, above Chozas on the Sierra de Guadarrama, Cerro de Cuelgamoros above the Escorial; prov. of Estremadura, on the Sierra de Majareina above Plasencia; prov. of Aragon, on the summit of Tolocha above Peñarroya; prov. of Andalusia, on the Sierra Nevada up to 2400 metres, on bare soil.—Algeria (as *C. Atlanticum*).—Asiatic Turkey: vilayet of Anatolia, Mt. Almadagh above Ushak (*Balansa*, 1857); vilayet of Erzeroum (*Aucher-Eloy*, no. 614).—This last specimen cited is that which is taken up by Grenier as the type of his *C. Armeniacum*, a species most distinctive, in which the teeth of the capsule are circinate-convolute. It is quite probable that on the original sheet specimens of *C. Duriæi* and *C. Armeniacum* were mixed, which is unfortunate. In Herb. Kew. these particular specimens, with Aucher-Eloy's authentic label, are affixed to a sheet with undoubted specimens of *C. Duriæi* (or rather original specimens of *C. ramosissimum* Boiss.); and in both these specimens, which are quite unmistakable, the teeth of the capsule have revolute margins. There are also in their proper place specimens of *C. Armeniacum*, but these do not include authentic specimens (no. 614) on which Grenier founded this species, and to which Boissier refers in *Fl. Orientalis*, p. 719. An examination of Grenier's types would not, therefore, clear this up. The specimens mixed and distributed under this same number include therefore the type of Grenier's species, and specimens of *C. Duriæi*, which extend further eastward the range of the latter. As Boissier has overlooked this, it is likely that the same misplacement of specimens obtains in other public herbaria.

Var. β Lamottei Le Grand (sp.), Stat. bot. Forez, 284, et suppl. 6; Nyman (var.), Consp. Fl. Eur. 110; Jacks. (syn.) Ind. Kew. i. 484; Rouy (subsp.), Suites Fl. de France, i. 66; Rouy & Fouc. (subsp.) Fl. de France, i. 221 (1896). Folia ovalia, apice rotundata vel perquam obtusa. Flores ovali-cylindrici sub anthesin obtusi. Sepala lanceolata-ovalia. Petala calyce paullum longiora. Capsula quam in typo longior.

Hab. France: dept. of Loire, at 700–800 metres above Soleymieu, Verrières, and Gumières, in the valley of the Vizezi, at 900 metres, between Fraisse and Courreau.

Var. γ Lydium Williams (= *C. ramosissimum* var. *rosea* Boiss. in herb.). 11–14 centim. Dichasium plurum florum. Sepala margine rosea. Petala carnea margine saturatiora, calyce $\frac{1}{5}$ parte breviora. Semina in capsula centrali 10.

Hab. Asiatic Turkey: Mt. Mesogis, above Trallés, in Anatolia (*Boissier*, 1842); S.W. Anatolia (*Pinard*, 1843).

105. C. echinulatum Coss. ex Battand. & Trab. Fl. de l'Alg. i. 148 (1888). The description given in this work is concise but meagre, and does not sufficiently place the species. The following is based on an examination of Warion's specimens, *Pl. Atlant. sel. no. 40* (1876), characters common to the subsection being omitted. I received the specimens from Cosson's herbarium.

Breviter velutino-glandulosum, 10 centim. Caules erecti vel adscendentes, simplices apicem versus in cymam dichotomam soluti. Folia inferiora obovato-spathulata in petiolum attenuata,

superiora lanceolata acuta uninervia sessilia. Flores micropetali; pedicelli fructiferi calycem subæquantes basi exacte refracti; bracteæ herbaceæ, foliis summis similes. Calyx basi truncatus; sepala acuta late scarioso-marginata petalis æquilonga. Capsula 12 mm., calyce duplo longior. Semina ferruginea echinulata subauriformia, dorso concava. Inter species monotocas ad *C. fragillimum* proximum.

Hab. Boghar and Daïa, in Algeria.

106. C. Edmonstoni Murbeck & Ostenfeld, ap. Murbeck, Nordeurop. formerna af slägtet *Cerastium*, in Bot. Notis. 1898, 246. I do not think that this plant is sufficiently characterized to be raised to specific rank. It was first described by H. C. Watson as a variety of *C. latifolium* (Edmonston, *Fl. Shetl.* 29 [1845]), and he does not seem to be far wrong in his estimate of its systematic position. It certainly seems identical with *C. arcticum*, and Shetland specimens, which, Mr. E. S. Marshall says, cover large patches in the island of Unst, agree very well with the figure of *C. arcticum* in *Fl. Danica*, t. 2963 (1880). Whether the latter is an hybrid between two forms of *C. alpinum*, or a local form of *C. latifolium*, is a matter of dispute among critical botanists. I certainly regard *C. latifolium* as a British plant, and have seen specimens from the north of Scotland which well match specimens from the Alps of French Savoy, the Alps of Küstenland, and from Lapland, except only in the size of the seeds.

(To be continued.)

REMARKS ON THE 'CYBELE HIBERNICA,' Ed. 2: A Rejoinder.

By Nathaniel Colgan, M.R.I.A., and R. W. Scully, F.L.S.

We have read with much interest the comments on the new edition of *Cybele Hibernica* contributed by our friend the Rev. E. S. Marshall to last month's issue of this Journal. As we were never sanguine enough to suppose that our judgments on the claims of various plants to native rank in the Irish flora would meet with anything like universal approval, we are not surprised to find that Mr. Marshall has many objections to make to our decisions. If we have erred, we certainly cannot plead haste as our excuse, for the claims of each species were weighed with the greatest deliberation before we proceeded to assign to each what we held to be its proper place in the flora.

It is hardly necessary to say that objections coming from Mr. Marshall are worthy of serious attention, and that we have given his "Remarks" all the attention they deserved. We have failed, however, to find in them any fresh evidence or any fresh arguments sufficient to induce us to alter our decisions. A detailed examination of these objections would occupy too much space here, and would necessarily drift into personalities, since the habit of mind of indi-

vidual observers is a very important element in the case for or against the admission of a plant to the full honours of nativity. Botanists are only human after all: each of us has his more or less of unconscious mental bias, his personal equation, as it may be called, and in any work founded, as is the *Cybele Hibernica*, on the testimony of a multitude of witnesses, it is unavoidable that the editors should form their opinions as to the peculiar quality of each witness. No man can be justly charged with presumption for doing what his office requires him to do; and we can only hope that in the discharge of our duty as editors we have succeeded in keeping a watchful eye on our own peculiar bias, and in avoiding, as we have endeavoured to do, anything like partiality or dogmatism in our judgments.

For these reasons we must content ourselves with noticing an example or two of what we consider inconclusive argument on Mr. Marshall's part. He contends, for instance, on behalf of *Iris fætidissima*, that its occurrence as native in Spain and Portugal is a reason why it should be admitted as native in Ireland. This argument, if accepted in all its nakedness, would lead to some strange conclusions. But probably the argument took in Mr. Marshall's mind some such form as this: the plant occurs native in Spain and Portugal, and also in North and Middle England, therefore it might be expected to occur in an intermediate latitude in South Ireland. So expressed, the argument would have some force, but must at once give way to the stronger adverse arguments drawn from the rarity of the plant in Ireland and the suspicious character of the stations it occupies. Again, in the case of *Euphorbia Peplis*, we are taxed with hastiness in excluding it from the actual flora of Ireland, since, as an annual, its appearances may be irregular. We should have far more justly incurred the reproach of negligence had we retained in our flora a plant recorded from a single station forty years ago and never found since, though sought for at least three times. Botanical patriotism is an amiable but pernicious weakness. We have struggled against it all along, and hope we have successfully resisted every inducement to unduly swell the flora of our native island, poor as it is in comparison with the more highly favoured sister island of Great Britain.

Once again, we are taxed with want of reserve in our treatment of *Sedum album* and *S. dasyphyllum*, the latter, as Mr. Marshall states, being "thought by its discoverers to be native in two of its Co. Cork stations." The two discoverers here mentioned must be the Rev. T. Allin, who says it "appears quite wild," and our friend Mr. Phillips, who says it is found "abundant and looking native." "Quite wild" can only mean "certainly not native," and "looking native" surely implies a doubt in the speaker's mind as to the plant's true nativity. Yet Mr. Marshall has carelessly translated these cautious statements into a plea for nativity in the mouths of both witnesses. As for *Sedum album*, we never had the least doubt of its being an introduced plant; and we can assure Mr. Marshall that in this, as in many other instances, we have not thought it necessary to encumber the pages of the new edition of *Cybele*

Hibernica by a setting-out of all the evidence on which our judgments are based.

It would almost seem from the tenor of Mr. Marshall's "Remarks," when treating of *Geranium columbinum*, *Lotus tenuis*, and *Iris fœtidissima*, that the writer had fallen into the grave error of using the words "wild" and "native" as synonymous. This, however, may be nothing more than an instance of "loose writing," a good deal looser, we would venture to suggest, than any we ourselves may have been guilty of in dealing with such a pre-eminently loose subject as the Batrachian Ranunculi.

As for *Orchis latifolia*, had the evidence in Mr. Marshall's possession been in ours when preparing the *Cybele* MS., we should have unhesitatingly admitted the plant to the Irish flora. But, unfortunately, that evidence was not in our possession, and what evidence we had we then considered, and still consider, insufficient. In the case of *Brachypodium pinnatum*, the report of its discovery by Mr. Phillips reached us barely in time to admit of its finding a place in the last sheet of the Appendix. Had it arrived a month earlier, we should probably have placed it, with a dagger-mark, in the text proper.

In conclusion, we desire to say that the tone of Mr. Marshall's comments leaves nothing to be desired. Outspoken as they are, they never transgress the limits of fair criticism, while they give evidence of his careful study of the book he reviews. Mr. Marshall has already done good service in the cause of Irish botany. We trust that he will continue to give it the benefit of his critical knowledge, and that a closer acquaintance with our island flora may have the effect of converting him to our scepticism.

ALSINE IN THE BRITISH FLORA.

By W. P. Hiern, M.A., F.L.S.

In the *Journal of Botany* for last year (p. 496) I showed that the genus *Buda* Adans. (1763) is not suitable for use, as in the last edition of the *London Catalogue of British Plants*, p. 12, n. 71 (1895), to include the species which are well known to British botanists under the generic name of *Spergularia* or *Lepigonum*; for *Buda* really belongs to *Spergula* L. (1753), and this conclusion is confirmed in the index to Adanson's book, where, on p. 528, the Linnean genus is quoted as a synonym. It is now proposed to deal with the suggestion that *Alsine* L. (1753), an adaptation of an old classical name, should be retained for the British species, since they are congeneric with the continental *A. segetalis* L. Sp. Pl. ed. 1, 272 (1753); it was in principle so treated by Reichenbach, Fl. Germ. Excurs. 566 (1832); Linnæus placed his genus in the class Pentandria Trigynia.

The four British species will then, with their principal synonymy, stand thus:—

1. Alsine rubra Crantz, Instit. ii. 407 n. 18 (1766), excl. var. *β*.

Arenaria rubra α campestris L. Sp. Pl. ed. 1, 423 (1753).
Spergularia rubra J. & C. Presl, Fl. Cech. 94, n. 686 (1819); Syme, Engl. Bot. ed. 3, ii. 129. t. 254 (1863).
Lepigonum rubrum Wahlb. Fl. Gothob. 45 (1820).
Buda rubra Dumort. Fl. Belg. 110, n. 1422 (1827); F. J. Hanb. Lond. Cat. ed. 9, 12, n. 260 (1895).
Lepidogonum rubrum Wimm. Fl. Schles. ed. Goepp. i. 78 (1844).
Spergularia campestris Aschers. Fl. Prov. Brandenb. 94 (1864).
Tissa rubra Britton in Bull. Torr. Club, xvi. 127 (8 May, 1889).
T. campestris Pax in Engl. & Prantl, Nat. Pflanzenfam. iii. 1 *b*, 85 (June ?, 1889).

2. Alsine rupicola.

Spergularia rupestris Lebel, Rech. Pl. Manche (1848); Syme, Engl. Bot. ed. 3, ii. 132, t. 256 (1863); non Cambess. (1829).
Lepigonum rupestre Kindb. Syn. Framst. Lepig. 8 (1856).
Spergularia rupicola Lebel ex Jolis in Mém. Soc. Sc. Nat. Cherbourg, vii. 274 (1860).
Lepigonum rupicola A. G. More in Engl. Bot. Suppl. v. t. 2977 (1 Febr. 1864).
Spergularia macrorhiza (Req.), var. *β rupestris* Caruel, Fl. Ital. ix. 623 (1892).
Buda rupestris F. J. Hanb. Lond. Cat. ed. 9, 12, n. 263 (March, 1895).
Spergularia Lebeliana Rouy in Bull. Herb. Boiss. iii. 223 (May, 1895).
Note.—*Alsine rupestris* Fenzl (1833) is a different plant.

3. Alsine media Crantz, Instit. ii. 407, n. 19 (1766) excl. syn., pro parte; non L. (1753).

Arenaria rubra β marina L. Sp. Pl. ed. 1, 423 (1753), pro parte.
A. media L. Sp. Pl. ed. 2, 606 (1762), excl. syn., pro parte.
Alsine rubra var. *β*, Crantz, *l. c.*, n. 18, pro parte.
A. maritima Pall. Reise Russ. iii. 603 (1776).
A. marina Sm. Fl. Brit. ii. 480 (1800), excl. var. *β*; Sm. Engl. Bot. xii. t. 852 (1801).
Spergularia salina J. & C. Presl, Fl. Cech. 95, n. 687 (1819).
Alsinella media Hornem. Nomencl. Fl. Dan. 32, n. 740 (1827).
Buda marina Dumort. Fl. Belg. 110, n. 1423 (1827); F. J. Hanb. Lond. Cat. ed. 9, 12, n. 261 (1895).
Alsine marina Reichenb. Fl. Germ. Excurs. 566, n. 3661 (1832); non Wahlenb. (1826).
Lepigonum salinum G. Don in Sweet, Hort. Brit. ed. 3, 69 (1839); A. G. More in Engl. Bot. Suppl. v. t. 2978 (1 Nov. 1863).
L. medium Fries, Mant. iii. 33 (1842).
L. neglectum Kindb. Syn. Framst. Lepig. 6 (1856).
Spergularia neglecta Syme, Engl. Bot. ed. 3, ii. 129, t. 255 (1863).
S. Dillenii Lebel in Mém. Soc. Sc. Nat. Cherbourg, xiv. 43 (1868).
Tissa marina Britton in Bull. Torr. Club, xvi. 126 (1889).

Note.—Types of *Arenaria* foliis linearibus, longitudine internodiorum, L. Hort. Cliff. 173 (1737); Clayton, Fl. Virg. 161 (1743), as quoted in L. Sp. Pl. ed. 1, *l. c.*, are in the National Herbarium; none of these types belong to the next species. The character given for *Alsine media* by Crantz, *l. c.*, is identical with that given by Linnæus for *Arenaria media*, *l. c.*; both authors cite a synonym which belongs to *Spergula pentandra* L. Sp. Pl. ed. 1, 440; Linnæus's description of his *Arenaria media*, *l. c.* and some of his synonymy certainly include the next species. A somewhat similar remark applies to *Arenaria rubra β marina* L.; for the synonym, *Spergula marina nostras* Ray, Hist. 1034 (1688), belongs to *Alsine marina* Wahlenb.; Ray placed it among his Alsines.

In 1721 Samuel Dale collected at Ramsgate both these species together, and he noted their differences; the specimens with his tickets are preserved in the National Herbarium; one of his specimens he called *Spergula marina* Buxb., and he added, "Ruppius and Buxbaum would have this the *Spergula marina nostras* J. B., from whom Dr. Dillenius dissents"; the other he called by the latter name, and he added the following note:—"The seeds are brown and flat with a white rim as Magnol writes the Monspelier plant had. Altho' J. Bauhine doth not describe what seeds his plant had, yet finding it there and the figure so well resembling this makes me conclude it the same. The plant Morison mentions in Præludia Bot. 229 by the name of *Alsine Spergula semine foliaceo fusculo circulo membranaceo albo cincto* is a species of the common Spurry & not of the sea Spurry therefore Magnol's caution needless." This plant of Morison which Dale separated was the foundation of Adanson's *Buda*, and is *Spergula arvensis* L.

Dale's allusion to Magnol's caution probably referred to Magnol, Bot. Monspel. 14 (1676), where, after noting the similarity between the winged seeds of the sea spurry and Morison's account of the seeds of his plant, Magnol concluded his paragraph with the words "unde cavendum ne multiplicentur Spergulæ species."

By limiting Crantz's name so as to stand for *Lepigonum medium* Fries, the giving of a new name under *Alsine* is avoided. *Alsine media* L. is *Stellaria media* Vill. (1789).

4. Alsine marina Wahlenb. Fl. Suec. 281, n. 505 (1826); non Reichenb. (1832).

Arenaria rubra β marina L. Sp. Pl. ed. 1, 423 (1753), pro parte.
A. media L. Sp. Pl. ed. 2, 606 (1762), excl. syn., pro parte.
Alsine media Crantz, Instit. ii. 407, n. 19 (1766), excl. syn., pro parte.
A. rubra var. *β*, Crantz, *l. c.*, n. 18, pro parte.
Arenaria marina var. *β*, Sm. Fl. Brit. ii. 480 (1800); Engl. Bot. t. 958 (1801).
A. marginata Lam. & DC. Fl. Fr. iv. 793 (1805); DC. Ic. Pl. Gall. Rar. i. 15, t. 48 (1808); non Schlecht. (1813).
Lepigonum marinum Wahlb. Fl. Gothob. 47 (1820).
Buda media Dumort. Fl. Belg. 110, n. 1424 (1827); F. J. Hanb. Lond. Cat. ed. 9, 12, n. 262.

Alsine marginata Reichenb. Fl. Germ. Excurs. 556, n. 3662 (1832); non Schreb. (1771).

Spergularia marginata Kittel, Tauschenb. ed. 2, 1003 (1844); Syme, Engl. Bot. ed. 3, ii. 131, t. 257 (1863).

S. marina Lebel in Mém. Soc. Sc. Nat. Cherbourg, xiv. 41 (1868).

The restoration of *Alsine* L. having been made, it becomes necessary otherwise to provide for those plants of ours which at present bear names under *Alsine* Wahlenb. (1812). In the *Genera Plantarum* Bentham & Hooker reduced them all to *Arenaria* L. (1753), but modern authorities on *Caryophyllaceæ* agree in keeping them distinct from the latter genus on account of their capsules opening by only as many valves or teeth as they have styles. Among the generic names available for the purpose is *Minuartia* Loefl. (1753), the typical species of which is nearly related to the groups containing our plants; one of the latter, a species which was long ago reported from Scotland, though it perhaps does not now grow there, has already received a name under *Minuartia*: arranged under this genus, our species will stand as follows:—

1. Minuartia stricta.

Spergula stricta Swartz in Vet. Acad. Handl. Stockh. xx. 229 (1799).

Arenaria uliginosa Schleich. ex Lam. & DC. Fl. Fr. iv. 786 (1805); Engl. Bot. Suppl. iv. t. 2890 (1 Oct. 1844); F. J. Hanb. Lond. Cat. ed. 9, 12, n. 240 (1895).

Alsine stricta Wahlenb. Fl. Lappon. 127 (1812).

Alsinella stricta [Sw.] Summ. Veg. Scand. 17 (1814).

Sabulina stricta Reichenb. Fl. Germ. Excurs. 789, n. 4935 (1832).

Alsinanthe stricta Reichenb. Ic. Fl. Germ. v. 29 (1841).

A. uliginosa Reichenb. *l.c.* t. 209, f. 4935 (1841).

Alsine uliginosa Syme, Engl. Bot. ed. 3, ii. 115, t. 244 (1863); non Vill. (1779).

2. Minuartia verna.

Arenaria verna L. Mant. Pl. i. 72 (1767); Sm. Engl. Bot. viii. t. 512 (1 Nov. 1798); F. J. Hanb. Lond. Cat. ed. 9, 12, n. 238 (1895).

Alsine verna Wahlenb. Fl. Lappon. 129 (1812); Syme, Engl. Bot. ed. 3, ii. 109, t. 241 (1863).

Var. *β* Gerardi (F. J. Hanb. *l.c.* n. 238 *b*).

Arenaria liniflora Jacq. Fl. Austr. v. 22, t. 445 (1778); non L. (1762).

A. Gerardi Willd. Sp. Pl. ii. 729 (1799).

Alsine Gerardi Wahlenb. Fl. Carpat. 132 (1814).

Sabulina Gerardi Reichenb. Fl. Germ. Excurs. 788, n. 4928 (1832).

3. Minuartia rubella.

Alsine rubella Wahlenb. Fl. Lappon. 128, t. 6 (1812); Syme, Engl. Bot. ed. 3, ii. 111, t. 242 (1863).

Arenaria cherlerifolia G. Don, Cat. Pl. Forfar Gard. 9 (1813).

A. sulcata Schlecht. in Ges. Naturf. Fr. Berl. Mag. vii. 212 (1813); F. J. Hanb. Lond. Cat. ed. 9, 12, n. 239 (1895).

Alsinella rubella [Sw.] Summa Veg. Scand. 17 (1814).

Arenaria quadrivalvis R. Br. in Parry, 1st Voy. app. 271 (1823).

A. rubella Sm. Engl. Fl. ii. 309 (1824); D. Don, Engl. Bot. Suppl. i. t. 2638 (1 May, 1830).

Alsine hirta β rubella Hartm. Handb. Skand. Fl. ed. 3, 104 (1838).

4. Minuartia fasciculata Reichenb. Ic. Fl. Germ. v. 28 (1841).

Arenaria fasciculata L. Syst. Nat. ed. 12, ii. 733 (1767); Jacq. Fl. Austr. ii. 49, t. 182 (1774).

Stellaria rubra Scop. Fl. Carn. ed. 2, 316, n. 538, t. 17 (1772).

Arenaria fastigiata Sm. Engl. Bot. 1744 (1 May, 1807); non Phil. (1856).

Alsine fasciculata Mert. & Koch, Deutschl. Fl. iii. 288 (1831), excl. syn.

Sabulina fastigiata Reichenb. Fl. Germ. Excurs. 786, n. 4919 (1832).

M. fastigiata Reichenb. *l. c.* 28, t. 208, f. 4919.

Alsine fastigiata Bab. Man. Br. Bot. ed. 1, 51 (1843); Syme, Engl. Bot. ed. 3, ii. 114, t. 243 (*bis*) (1863).

A. Jacquini Koch, Syn. Fl. Germ. ed. 2, 125 (1843).

Note.—Reported from the Scotch highlands, but without recent record, and not included in the *London Catalogue;* specimens from G. Don are in the National Herbarium.

5. Minuartia tenuifolia.

Arenaria tenuifolia L. Sp. Pl. ed. 1, 424 (1753); Engl. Bot. iv. t. 219 (1794); F. J. Hanb. Lond. Cat. ed. 9, 12, n. 241 (1895).

Alsine tenuifolia Crantz, Instit. ii. 407, n. 22 (1766); Syme, Engl. Bot. ed. 3, ii. 112, t. 243 (1863).

Sabulina tenuifolia Reichenb. Fl. Germ. Excurs. 785, n. 4916 (1832).

Note.—Apparently different from *Minuartia tenuifolia* Nees ex Mart. Hort. Erlang. 44 (1814), which has been referred to *M.* (*Arenaria*) *mucronata* (L.).

The two following British plants belong to the same genus:—

6. Minuartia sedoides.

Cherleria Sedoides L. Sp. Pl. ed. 1, 425 (1753); Sm. Engl. Bot. xvii. t. 1212 (1 Sept. 1803); non Forsk (1775), &c.

C. cespitosa Lam. Fl. Fr. iii. 46 (1778).

Alsine Cherleria Fenzl ex Peterm. Deutschl. Fl. 85 (1849); Syme, Engl. Bot. ed. 3, ii. 108, t. 240 (1863).

A. sedoides Kittel, Fl. Deutschl. ed. 2, 997 (1844); non alior.

Arenaria Cherleria Ardoino, Fl. Alpes-marit. 65 (1867); Hook. f. Stud. Fl. ed. 1, 60 (1870).

Alsine Cherleriana St. Lager in Ann. Soc. Bot. Lyon, vii. 144 (1880).

Arenaria Cherleri Benth. ex Hook. f. Stud. Fl. ed. 3, 65 (1884).

Cherleria sediformis Cariot & St. Lager, Étud. Fl. 119 (1889).

Arenaria sedoides F. J. Hanb. Lond. Cat. ed. 9, 12, n. 248 (1895); non B. D. Jacks. (1893), nec Fröl. ex Reichenb. Fl. Germ. Exc. 794 (1832).

Note.—*Alsine sedoides* Froel. ex Koch, Syn. Fl. Germ. ed. 1, 114 (1836), which in the Kew *Index*, i. 181 (1893) is also quoted as *Arenaria sedoides*, is *Alsine verna* var. c. Wohlf. in Koch, Syn. Deutsch. ed. 3, i. 284 (1892).

7. Minuartia peploides.

Arenaria peploides L. Sp. Pl. ed. 1, 423 (1753); Sowerby, Engl. Bot. iii. t. 189 (1 July, 1794); F. J. Hanb. Lond. Cat. ed. 9, 12, n. 247 (1895).

Alsine peploides Crantz, Instit. ii. 406, n. 11 (1766); Syme, Engl. Bot. ed. 3, ii. t. 239 (1863).

Honkenya peploides Ehrh. Beitr. ii. 181 (1788).

Honkeneja peploides Bab. Man. Brit. Bot. ed. 3, 48 (1851).

Honkeneya peploides Syme, *l.c.* 106.

NOTES ON EAST ANGLIAN BOTANY.

By Arthur Bennett, F.L.S.

The following notes may be taken in connection with those on Cambridgeshire plants in the last number of this Journal. A few of those for Suffolk are taken from James Crowe's copy of the second edition of Hudson's *Flora Anglica* in the library of the Linnean Society. Many of those for Norfolk are taken from the same copy, which supplies the original stations for many Norfolk plants; some of these were contributed to *The Botanist's Guide* (1805), but the majority were not published.

The Rev. W. W. Newbould, in his copy of Kirby Trimmer's Norfolk Flora (which I possess), speaks rather strongly of the way in which Trimmer treats the old authors, with whose records anyone who writes a future Flora of Norfolk will have to collate Trimmer's work.

Suffolk.

Ranunculus fluitans L. Brandon River, 1878.

Helleborus viridis L. Brundish, *Herb. Sherard at Oxford* (*ex Druce*).

Althæa officinalis L. Ditches below Burgh Castle, 1843, *Herb. Hailstone*.

Genista pilosa L. "The heaths near Bury are yellow with this plant in June, but after it is difficult to find, as it creeps under the mosses. T. Woodward," *Crowe*.

Epilobium roseum L. Nayland, *E. F. Linton in J. Bot. 1890*, p. 4.

Tillæa muscosa L. Near Benacre Broad; Toby's Walks, Blythburgh; Tinker's Walk, July, 1896, *Salmon*.

Œnanthe silaifolia Bieb. There is a specimen of the true plant from Sir J. Cullum in herb. Banks, 1774. Dr. Hind (*Flora of*

Suffolk, p. 170) thinks it may have been *Œ. pimpinelloides*, but that is not a likely species to occur.

Sambucus Ebulus L. Long Melford, plentifully, *Crowe*.

Gnaphalium luteo-album L. In August, 1896, Mr. Burkill had a fragment of this, sent for identification, from near Mildenhall; it is given as extinct in the *Flora*.

Senecio palustris DC. Haddiscoe, Suffolk, 1791, *T. Woodward ex herb. Winch at Linnean Society*. Burgh near Yarmouth, *Winch herb.* *Sonchus palustris* and *Lathyrus palustris* used to grow in this locality.

Erythræa pulchella Fr. There are specimens gathered at Lowestoft, 24 Aug. 1802, in the British Museum Herbarium.

Orobanche elatior Sutt. Found by Borrer near Barton: *Fl. Shropsh.* p. 530.

Veronica spicata L. Cavenham Heath, 1793, *Herb. Hailstone.* — *V. verna* L. Plentifully in the fields nearly one mile from Thetford road to Bury, April 23, 1801; the leaves are of a purple-brown, and the whole plant in this situation not above an inch high, *Crowe*.

Fritillaria Meleagris L. "Scare Fen" (*Suffolk Flora*, p. 845) should read "Scare's Farm, 1780," *Crowe*.

Potamogeton zosterifolius Schum. Ditch by the river Lark, two miles from Prickwillow, 20.8.1897, *Bullock-Webster*! New to the Flora.

Cladium Mariscus Brown. Burnt Fen, near Eriswell, *Crowe*. The greater part of this fen is in Cambridgeshire, but a small portion is on the other side of the river.

Digitaria sanguinalis Scop. Bungay, Suffolk, *J. Tatham in herb. Hailstone.*

Chara contraria Kuetz. Benacre Broad, July, 1896, *Salmon*! — *C. canescens* Loisel. Benacre and Easton Broad, July, 1896, *Salmon*!

Norfolk.

Unless otherwise stated, the localities are from Mr. Crowe's notes.

Myosurus minimus L. Repps, plentiful!

Silene Otites Wibel. Near Narford, in the road to Narboro', and the whole way in the lane from Narford, as well as both sides of the Swaffham road by Sir H. Peyton's house. — *Holosteum umbellatum* L. On the city walls between St. Austin's and Magdalen Gates; Mr. Carter's garden walls at Thorpe; near the back of Mr. G. Maltby's garden; between Magdalen and Pockthorpe Gates.— *Moenchia erecta* Gaertn. Sandy hills, Ditchling; Porlingland Heath; Mousehold Heath.

Linum perenne L. Chalk-pit at Marham, and elsewhere in that parish where the chalk lies near the surface.

Astragalus danicus Retz. Swaffham Heath; Marham, and on the road thence to Narboro', in good plenty.

Geum rivale L. Meadows at Marham; Holt Wood; Dereham Meads; pastures, right hand, near eighteenth milestone to Walton (from Lakenham); Saham, 1800.

Parnassia palustris L. Costessy Common; Porland Heath; low parts of Swardeston Common.

Tillæa muscosa L. St. Faith's, Newton Bogs; Causton Heath; Felthorpe Bogs.

Bupleurum rotundifolium L. Among wheat and vetches at Marham; in the road three miles from Narboro' to Fincham.—*Caucalis daucoides* L. Near Marham, among winter wheat, with the *Bupleurum*. — *Sium latifolium* L. By the bridge at Scole that divides Norfolk; Wroxham. — *Sison Amomum* L. Side of road opposite Armingale Wood. — *Peucedanum palustre* Moench. Forster's Alder Carr, East Winch.—*Carum segetum* Benth. & Hook. f. In the hedge on the left side of the road between the pit at Binham, where *Crepis fœtida* grows, and Langham Heath, in a thick rough hedge.

Galium anglicum L. Upon the buttress, south side of Binham Church; wall at Rushford; road to Snettisham from Thetford.

Dipsacus pilosus L. Road leading to Ditchingham Church; Skateshill, at Snettisham; between the ninth and tenth milestones to Attleboro'.

Valeriana dioica L. Linstead Meads, Lakenham.

Senecio palustris DC. Brakenham-in-Ormsley; Caistor Common, near Yarmouth, 1781 (a specimen thence is in the Winch herb.); Halvergate (and there called "Trumpets"*); at Antingham, 1781; Geldeston, *Mr. Woodward, Newbould's MS.;* in the road from Norwich to Yarmouth, *J. M., Newbould MS.;* Methwold Fen, 1832, *W. Marshall, sp. in Watson's herb. at Kew;* by Heigham Bridge, *Paget in herb. Watson;* Wroxham Broad, near Hoveton, June, 1854, *F. J. A. Hort in herb. Babington*!; Filby, for many years from 1865! This species is often marked as perennial, but in my garden and at Filby it is a biennial. — *S. paludosus* L. The authority for this in Norfolk has been a specimen in Sir J. E. Smith's herb., with the note, "Gathered in Norfolk by Mr. J. Sherard and myself." I am able to add a definite locality, Redmore Fen, in W. Norfolk. *W. Marshall*, "extinct." — *Sonchus palustris* L. Meadows at Gaywood. Specimens from two of Kirby Trimmer's localities belong to the marsh form of *arvensis*: I have seen his specimens. — *Crepis fœtida* L. In a gravel and clay pit half a mile from Binham on the road to Langham, *H. B.*—*Hypochæris glabra* L. Between the eighth and ninth milestone on Cawston Heath; Narboro'; Great Cressingam; Costessy, common; field near Narford.

Campanula latifolia L. Old Canfield (Lakenham?); wood in Gressinghall.

Atropa Belladonna L. Between Downham and Swaffham, *T. Woodward;* near Cann Abbey, 1780; Markin's Farm at Gressinghall; on this side Thorpe turnpike.

Veronica montana L. Armingale Wood. — *V. triphyllos* L. In the fields of North Pickenham, sparingly.—*V. verna* L. Foulden.

Cuscuta europæa L. St. Faith's, Newton Heath; Bawsey white sands; Porlingland Heath.

Gentiana Pneumonanthe L. Leizate, on the low ground among *Erica tetralix*.

Orobanche major L. Carter's field at Thorpe; first hill on the

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* Not in Britten & Holland's Dict. of Engl. Pl. Names.

left hand in the last thoroughfare field going to Thorpe, in great plenty.

Teucrium Chamædrys L. City walls between Magdalen and St. Austin's Gates; between brazen door and St. Stephen's Gate.—*Mentha sativa* and *M. gentilis*. By the blacksmith's shop at Saham. —*M. piperita*, *M. hirsuta*, and *M. spicata*. By the public-house at Saham.—*M. rubra* Sm. Ditch of Clark's field at Saham. "1797, Saham, with Dr. Smith, 16 Sept." — *Lycopus europæus* L. Ashwicken; Shottingham, near the mill; Saham.

Utricularia vulgaris L. and *U. minor* L. St. Faith's, Newton Bogs.

Statice reticulata L. Marshes due N. of Blakeney Church; from Brancaster Staith to the town a hundred acres of ground might be found covered with it; at Holme and Snettisham; at Wells, sixty yards W. of the Old Sluice made by Sir C. Turner on the south side of the banks, and the port.

Scleranthus perennis L. Snettisham; Honeybeach.

Chenopodium murale L. Mann's farm-yard, Honingham. — *Atriplex pedunculata* L. Marshes by St. Ann's Fort, Lynn.

Rumex maritimus L. Allen's Marshes, Halvergate; Scoulton Mere; Gayton Common, near the turnpike; Stratton Heath.

Malaxis paludosa Sw. Between Horsford and Felthorpe, opposite the sixth milestone on Cawston Heath.— *Liparis Loeselii* Rich. was found in a meadow in St. Faith's, Newton, in the year 1767 by Mr. Pitchford. I found three specimens of it in same meadow in the most boggy part, 1788.

Herminium Monorchis Br. At Marham Chalk-pit; in a chalk-pit at Heacham, near the road thence to Snettisham, on the bank about twenty yards from the entrance to the pit on the right-hand side.

Aceras anthropophora Br. In several pasture fields at Ashwellthorpe, but sparingly; from this circumstance being well known to botanists, it is now nearly rooted out, 1785.

Paris quadrifolia L. Overton's Grove at Heydon; Sexton Wood in Hedingham.

Acorus Calamus L. River by Heigham Common; Surlingham Ferry.

Iris fœtidissima L. Bradenham.

Cladium Mariscus Br. Wroxham Broad.— *Schœnus nigricans* L. Bog near Heydon.—*Blysmus compressus* Panz. Bog at Ditchingham past the public-house; Lower common at Heydon. — *Rynchospora alba* Vahl. Bogs at Heydon; Felthorpe Bogs.— *Scirpus fluitans* L. Pits on Hainford Heath, by Blackmere. — *S. maritimus* L. Yarmouth; Snettisham; Wells; Acle. — *Carex curta* Good. Caistor Camp. — *C. limosa* L. Cawston Bog; St. Faith's, Newton Bogs; Cranberry Fen, East Winch.

Avena pubescens L. Marham Chalk-pit, *Mr. W. Holkham*; Forby's pastures, Saham.—*Calamagrostis epigejos* Roth. Ranaugh; Cawston Decoy. — *Aira canescens* L. By the rails in the part of Yarmouth Common from Caistor Common near the seashore; by the Pool Beacon at Wells; sparingly at Brancaster; Holme;

Snettisham. In several places Yarmouth "deans" are named: "denes" is the present spelling.—*Phleum Boehmeri* Wibel. Found at Narborough, July, 1780, in company with Mr. Woodward.—*Triticum caninum* L. Brown's Grove, Tacolstone, by the side of a pit there, 1780.

Lastræa Thelypteris Presl. At Heydon, by the Alder Carrs; past the public-house at Ditchingham; Ashwicken Fen; Bawsey Bottom. — *Osmunda regalis* L. Blackmere, on Hainford (Heath); on this side Horning Ferry; St. Faith's, Newton Bogs.

Pilularia globulifera L. Hainford and Stratton Heaths.

Lycopodium clavatum L. Felthorpe Bogs. — *L. inundatum* L. Cawston Decoy.

SHORT NOTES.

The Cambridge and Lincoln Selinum.—I am exercised by Mr. Bennett's remarks anent *Selinum Carvifolia* at Chippenham in the June *Journal* (p. 244). He casts about for the *raison* of Introduction, yet concludes his Court Inquiry with the finding: "of course it is quite naturalised and wild" in its Cambridge station. I fail to see what is quite meant by this. Of what species are the 60 to 80 year's-old trees belting the site? The rise of ground (a thing taking place, more or less quickly, all over our fenlands) is impugned as possibly not due to natural action; tho' it is fair to say that a statement the deduction of which is opponent to the thesis of non-nativity is made also, viz.—the spread of the plant into the fenny ground adjacent. Ground growing less fenny, one dare swear! But, do not plants always spread, by seed or runner, from some centre, even if the initial colony *be* natural? And this from the plant first finding, there, and then thereabout, the environment and continuing conditions that enable it to Be at all!

It seems to me that Mr. Bennett does not sufficiently grasp the grand fact showing-through all the petty facts of plant occurrences which botanographers note. This grand fact, which I believe Charles Kingsley first adumbrated, is that, independent of Man, though helped by him and his works, *A natural change is always and ever going on in our flora.* To the perambulating botanologist of 25 or 30 years experience, with his eyes open and his brain apt for an effort akin to that of mental arithmetic, no features of Flora change are oftener obtruded upon his notice than the regular modification ever taking place in the flower integers of any tract—the absolutely inevitable, often predicable, replacements of one kind of individuals by some other! There is the fact, explain it how we will. But seeds, we know, kept from air, deeply-buried, as water runs away turned up by earthworms, will remain viable for ages!

Dozens of instances of striking natural change well up in my memory from Lincoln alone. In 1876–9 I knew Linwood warren near Rasen thoroughly: wet-shod I wandered over every square yard of it, & knew the wet-sand-peat species its conditions permitted to exist, ranging as they did from *Breutelia arcuata*, *Aira uliginosa*,

Carex dioica up to *Comarum* and *Carduus pratensis*. Visiting the moor again in the late nineties, twice I satisfied myself these had gone (for a generation or two at least), the ground had grown drier, partly from circumferential drainage, partly from the growth of aggressive species, rushes, *Eriophorum vaginatum*, *Erica cinerea*, young *Pinus* and *Abies*—in the order here given—and now, in 1897, what had we there? *Gentiana Pneumonanthe*, *Hypericum pulchrum*, *Carex binervis* by hundreds, other xerophiles in plenty—the *Eriophorum vaginatum* even having gone, the drouth and soil-induration too much for it! Here is a sample of many similar transformation scenes I have watched, in slow make and unmake; and it has its Moral and its Application to many mysteries the botanist is faced by when he happens to come across a plant almost at the outset of its natural appearance in a locality. To Mr. Bennett's inferences regarding what Relhan and Holme found or omitted to record, I would say 'ditto,' and—of course they couldn't find what was probably not there.

At Broughton, Lincolnshire, *Selinum* seemed to me, and my companions the Revs. Fowler & Peacock, on the decrease in 1897—the wood-shaded marshy pastureland it grew in is getting too dry for it; but it was distinctly gaining here & there in the wetter thicketous lower levels adjacent, although not as much as it was losing on the higher ground. This one expects, and with such a class of species as *Selinum* or *Peucedanum*, *Silaus* or *Cicuta virosa* (ubiquitous in Lincoln East & West Fen long after Banks' time, now nearly gone, dike-banks bordered with *Galeopsis versicolor* and clean-kept lodes where it luxuriated, *Teucrium Scordium* at foot), especially with the three first-named, it is my deliberate opinion that another 25 or 30 years will see these *non-est* where we now gather them, whilst several other stations in other natural areas will have turned up. In this connexion, too, it is interesting and suggestive to recall the history of *Peucedanum palustre*, its life and death, on the Burtle peat-moors of out-west Somerset, as elucidated by the Rev. R. P. Murray and Mr. J. W. White.—F. Arnold Lees.

[The author's MS. has been followed implicitly throughout as to capital letters, etc.—Ed. Journ. Bot.]

Allium Schœnoprasum L. in Ireland.—In July, 1895 (and again in 1896), I discovered a flowerless garlic, thinly scattered over about two miles of the limestone tract lying immediately south of Lough Mask, E. Mayo, extending to within one hundred yards of Co. Galway, though I could not trace it across the border, where it probably occurs, which had quite the habit of Chives; the blooming of one plant now at length justifies my opinion. The nature of the locality forbids all reasonable doubt as to its wildness, and I think that a careful search will result in its being found elsewhere. The inflorescence of *A. sibiricum* from the Lizard, long grown in my garden, hardly differs except in the much shorter styles (perhaps a variable character), but their habit is quite distinct; the stouter, very glaucous, recurved leaves of *sibiricum* contrasting greatly with the green, straight foliage of *Schœnoprasum*. Yet, in spite of their constancy, they are scarcely more than varieties of one species, as

Babington and Hooker have ranked them. The wild Mayo plant, owing to the shallowness of the soil, was only from two to four inches high in those dry summers.—Edward S. Marshall.

Epipactis atrorubens Schultes.—With reference to Mr. Bennett's note on p. 274, I may mention that in 1885 I gathered a Helleborine at about 6000 ft. in a rocky wood near the Rieder Alp, Upper Valais, Switzerland, identical with the plant of Durness, Inchnadamph, and Betty Hill (W. Sutherland), which is also exactly represented by the beautiful figure in Max Schulze's *Die Orchidaceen Deutschlands, Deutsch-Oesterreichs und der Schweiz* (Jena, 1894), called *E. rubiginosa* Crantz on the plate, but *E. rubiginosa* Gaud. in the text; *E. atrorubens* Schult., *E. atropurpurea* Raf., and *E. media* Fr. being cited as synonyms. According to Nyman, however, Crantz published this as a variety of his *E. Helleborine*, and Gaudin as a variety of *E. latifolia*. These considerations appear to justify our present naming, and to negative Nyman's treatment of *E. ovalis* Bab. What Fries (*Mantissa*, ii. 54–5) says about his *E. media* does not seem to fit *E. atrorubens* very well—*e. g.* "folia ovato-lanceolata, in apicem æqualiter attenuata"; and the choice of the name *media* in itself suggests an intention of distinguishing his new segregate from that species, as well as from *E. latifolia*, since *E. microphylla* Sw. is not a Scandinavian plant. M. Schulze adopts the name *E. sessilifolia* Peterm. for what in Britain has been called *E. violacea* Boreau or *E. purpurata* Sm.; this, too, is admirably depicted.—Edward S. Marshall.

Plantago Psyllium L.—The occurrence of this as a Middlesex casual is thus recorded by Miller in Gard. Dict. ed. vi. (1759):—"There has been one Species of *Psyllium* found growing naturally in England, which is the Sort used in Medicine, which was in the Earth throwd out of the Bottom of the Canals which were dug for the Chelsea Water Works where it grew in great Plenty. The Seeds of this must have been buried there some Ages, for no Person remembers any of the Plants growing in that neighbourhood before."—James Britten.

Arenaria balearica in Sussex. — Mr. G. May has brought to the Botanical Department a specimen of this plant, which was found in some quantity at the foot of some rocks near East Grinstead during an excursion of the Toynbee Hall Natural History Society on May 28th.

Hierochloe borealis in Kirkcudbrightshire.—The Rev. George McConachie has sent specimens of the above grass from the coast of Kirkcudbrightshire, south of the town of Kirkcudbright, where it was found by Miss Mittelbach. The discovery, with a couple of specimens, was communicated to me by Mr. J. McAndrew, of New Galloway. The occurrence of the plant on the coast is nothing unusual, as it occurs plentifully in Finland in such positions; north to Svjatoj-noss, in Russian Lapland.—Arthur Bennett.

NOTICES OF BOOKS.

Catalogue of the Library of the Royal Botanic Gardens, Kew. Bulletin of Miscellaneous Information. Additional Series III. Sold at the Gardens. 1899. Paper boards, pp. viii, ff. 790. Price 7s. 6d. [500 copies printed.]

It weighs 5 pounds, is nearly $3\frac{1}{4}$ inches thick, and contains 1588 pages, 790 of which are blank. For this last feature there is probably some sufficient but not obvious reason. It will be useful for the Kew authorities, and will save the trouble of interleaving their copy for the reception of additions; but the 499 purchasers of the Catalogue will hardly employ it in this way, and their gratitude for the provision of about 800 pages of blank paper will hardly compensate for the expense and inconvenience of making the book twice as large as it need have been. Such purchasers will be inclined also to regret that so portly a volume was not produced in a binding more appropriate to its bulk; and they may justly think that some lettering more descriptive of the contents of the work than "Kew Bulletin—Additional Series III." might appear upon its broad back.

It is, however, by the inside of such a work as this that it must be judged, and the fact that the Catalogue has been prepared by Mr. B. D. Jackson prepossesses one strongly in its favour. We learn from the preface contributed by the Director of the Gardens that Mr. Jackson has had "the assistance of the scientific staff," but we are not told in what this help has consisted, or who is responsible for the main arrangement of the work. We can hardly suppose that Mr. Jackson planned the division of the Catalogue into four parts, described as "General," "Travels," "Periodicals and Serials," and "Manuscripts." Common sense as well as general practice dictates that a work of this kind should be arranged throughout under one alphabet, and this method is nowadays adopted in all good catalogues; the quadripartite plan adopted in this Catalogue causes a needless expenditure of time, trouble, and temper. To take an illustration, the first name we looked up was that of Sir Joseph Banks. Here we find "Voyage in the 'Endeavour.' *See* Hawksworth, J." For this we have to go to "Travels," where we find it under "Hawkesworth"; and in the same division we find under "Banks" Sir Joseph Hooker's edition of his 'Journal'—there is no cross-reference from the "General" section to this entry, and it was only by accident that we came upon it. Later on we find five entries under Banks's name in the section devoted to "Manuscripts"—again without any cross-reference to or from the two other sections in which his name occurs! It would seem, therefore, that before we can be sure that we have all the information contained about only one writer, we must refer to each of the four sections of the Catalogue: a waste of time which might easily have been obviated by placing all entries in one alphabet, or even, to some extent, by the use of cross-references. We can hardly suppose that so experienced a bibliographer as Mr. Jackson is responsible for this irritating and misleading mode of entry, and it

is difficult to understand how it can have commended itself to the Director or to the "scientific staff."

Although it is thus at once evident that the execution of the work leaves much to be desired and that its usefulness is materially impaired by inconvenient arrangement, this Catalogue is an interesting record of the valuable collection of botanical literature brought together at Kew. We do not quite know with what object it has been published, for of course the books cannot be borrowed, and they are for the most part more readily available at the British Museum at Bloomsbury or at South Kensington; but no doubt those responsible for its publication had sufficient justification for their action. A very casual inspection, however, makes it apparent that its bulk might have been greatly lessened—perhaps by nearly one-half—without loss to its utility and with gain to the convenience of those using it, by the omission of pulls, abstracts, separate issues, book catalogues, local guides, poems, syllabuses, temporary indexes, useless entries, and the like, which abound throughout the work.

It is in the catalogue of manuscripts that this exuberance of entry is most manifest. There are, no doubt, interesting MSS. at Kew, but their proportion to the mass of worthless entries which form the bulk of the list is small. For example, take the following:

"**Guillemard, F. H. H.** *Cypripedium Gardineri.* [Transcript by R. A. Rolfe, of the description given in "The cruise of the 'Marchese'" 1886.] 2 ff."

Why a "transcript" of an imperfect description from a book which the Catalogue shows to be in the Kew library should be considered worthy of preservation, it is not easy to imagine; still less do we understand why the name of the transcriber should be placed upon permanent record. Here is another example:

"**Fox, Henry Elliott.** See Lawson, M. A."

"[Lawson, Marmaduke Alexander, & Henry Elliott Fox]. List of [plants ?] found in the Isle of Skye. 8 ff. fol."

This can hardly be anything but the draft or the MS. of the list published in this Journal for 1869, pp. 108–14: it is a fair sample of the contents of this portion of the Catalogue, which contains single letters, often from persons unknown to fame, two-page lists, sometimes anonymous, such as

"**Peebles.** Flora of Peebleshire, 6 July, 1880. 2 ff. 8vo.";

and such illuminative double entries as

"**Niger.** See **Africa**, West."

"**Africa**, West. Niger Expedition. fol."

If the library catalogue of every scientific establishment were compiled on these lines, the world itself could hardly contain the books that should be written.

Another remarkable entry is the following:—

"**Bauer, Ferdinand.** Enumeration of plants drawn by Ferdinand Bauer, & forming three volumes, in the Library of the Admiralty (now in the British Museum, Botanical Department, South Kensington), compared by Mr. E. G. Baker, 1888. W. B. H[emsley]. 4to."

The drawings in question were presented to the Department of Botany by the Admiralty in 1843, and many years since were mounted in a way suitable to their value and placed in eight Solander cases; Mr. E. G. Baker does not remember to have made any comparison, nor is it stated with what the comparison was made.

It is unnecessary to multiply instances of this kind of entry; they crowd every page. But there are errors of omission as well as of commission. There are at Kew valuable collections of drawings —*e. g.* the interesting series made for the *Botanical Magazine* from 1800 to 1826, acquired in 1891,* as well as, if we mistake not, those for at least the last thirty years; those of Roxburgh and other Indian botanists; some of Bauer's Heaths †—but of these we can find no mention. It might be supposed that drawings are altogether excluded, but this is not the case; for we have such entries as

"**Bond & Duncanson's** drawings in Kew Collection [by R. CUNNINGHAM]. fol."

and

"**Clark, J. Aubrey.** Drawings of fungi: ined. 2. 1873–79. 4to."

which show that unimportant and insignificant figures are carefully, if somewhat oddly, recorded. If "Bond and Duncanson's drawings" are really "by R. Cunningham," it would seem that they should be catalogued under his name. No information is given as to what the drawings represent, but that is quite in accordance with the maddening practice of bibliographers, whose aim it often appears to be to give details about mint and anise to the neglect of weightier matters. For example, we are told, under "Hill, John," that there is at Kew "an 8vo. volume of 122 leaves and 42 drawings," but it is not thought necessary to give any indication as to what plants are represented.

We have not noticed many obvious errors in looking through the volume; one such may be noted on fol. 662, where William Whale's odd little undated book on Egham plants is given as "[1785 ?]": 1875 is more likely to be correct. On fol. 195 we find "Fielding, Henry Wemyss" sandwiched between "Feilden, Henry Wemyss" and "Feilden, Oswald Mosley." Mr. Feilden's "Rare Welsh Plants" is a mere list of no value, appended to the Report of a Welsh Land Commission, and certainly does not merit entry in a Catalogue of this kind. But we look in vain for information as to the dates of the separate parts of certain Kew publications, which is probably to be obtained only at Kew, and might fairly have been expected in such a book as this.

The 'List of Kew Publications' published in 1898 was as remarkable as this Catalogue for its redundancies and omissions, and some of the latter were supplied later in the *Kew Bulletin*; it would be well in like manner to supplement the present work by a list of the drawings at Kew, and also to print Prof. Oliver's MS. index to the Hookerian periodicals. Should the *Bulletin* have been discontinued, as seems possible, for it is eight months since a number

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* Journ. Bot. 1891, 22. † *L. c.* 1899, 182.

appeared, these lists might be printed in the "additional series," or we should be glad to afford them a place in the pages of this Journal.

We cannot help regretting that Mr. B. D. Jackson should have expended so much time and trouble upon a Catalogue which cannot be considered either as up to the standard we expect in such publications, or as adequately representing the bibliographical knowledge which he undoubtedly possesses.

On Craterostigma pumilum Hochst., a rare plant from Somali-land. By H. Marshall Ward, D.Sc., F.R.S., and Miss E. Dale. (Trans. Linn. Soc. vol. v. part 10; "April" [May] 1899.)

It must be supposed that the extremely outspoken criticisms passed upon the systematic portion of this paper when it was read before the Linnean Society did not reach the ears of the authors. Otherwise it would not be easy to understand why the interesting researches into the internal structure of *Craterostigma* are prefaced by an introduction which sets forth, at considerable length, the mode by which the perfectly well-known and uncontroverted position in the vegetable kingdom of a plant familiar to systematists was arrived at by the Professor of Botany in the University of Cambridge. We are glad that he finds systematic botany interesting, but the descriptive portion of his paper is of no higher level than would be furnished by the students at an ordinary examination in botany, and it is difficult to imagine on what ground the Linnean Society accorded it a place in its *Transactions*. Some of the statements, indeed, are at least superfluous; *e.g.* it is unnecessary to say that a peduncle is "leafless"; and when leaves are "crowded into radical rosettes" the internodes may be assumed to be "practically obsolete." It is of course possible that the roots arise "from the bases of older leaves," as well as from the rhizome; but the plate does not bear out this statement.

Having explained to us how they ascertained the systematic position of the plant, the authors proceed to give their views as to its synonymy. These are not lucidly stated, but, so far as we understand them, they are true, though not new. The implied doubt as to the geographical distribution of the plant—"it comes from Abyssinia *or* Somali-land"—might have been omitted. In any case, indeed, it is not quite easy to know what is meant by the alternative; for the plant on which the paper is based came from Somali-land, while the type of the species was from Abyssinia. In the latter region it was first found by Salt, upon whose specimens —assigned by Bentham (in DC. Prodr. x. 411) to *C. plantagineum*— Brown based his genus *Dunalia*, published as a *nomen nudum* in Salt's *Abyssinia* (1814). We have the same plant from Kikuyu, collected by Mr. F. J. Jackson in 1889, and the Berlin Herbarium distributes under the same name specimens collected by Dr. Volkens at Kilimandscharo in 1893, so the plant does not seem to be as "rare" as the authors suppose. It is, we think, to be regretted that in this, as in all similar cases, the National Herbarium should not have been consulted; had this been done, the authors would have been enabled, as has been shown, to render their account of the distribution of *C. pumilum* more complete.

De Danske Blomsterplanters Naturhistorie. C. Raunkiær. Part I. Monocotyledons. 8vo, pp. lxix, 724, tt. 293. Copenhagen, 1895–1899.

It is matter for regret that this book is written in Danish. A general account of the morphology, anatomy and biology of a large number of North European monocotyledons should interest many British and other botanists, but we fear the language will be a barrier which but few will trouble to surmount. It is one thing to worry through a paper the contents of which have important bearing on some special piece of work; it is another to read 700 pages in the way of general literature. And we do not pretend to review the volume as thoroughly as it deserves. Fortunately there is a fair sprinkling of illustrations; according to the title-page there are 1089 figures in 293 figure-groups, which are sufficiently clear and are accompanied by good explanations.

The arrangement of the subject-matter is systematic in the first instance, the various genera being considered under their respective orders. The treatment of individual genera varies according to size and importance in the flora. Thus *Potamogeton* occupies nearly eighty pages, and the account includes a comparative investigation of the internal structure of the stem and the form of the leaf, the various methods of growth and hibernating, the morphology of flower and fruit, several pages on the anatomy of hybrid forms, and, finally, a systematic grouping of the species. One hundred and fifty pages are devoted to the Grasses. In connection with the latter are numerous useful figures illustrating the method of growth and succession of axes, with sections showing the plan of structure of stem and leaf in many of our common British species, such as *Holcus mollis*, *Agrostis canina*, *Phleum pratense*, &c. The biology of the flower and germination of the seed has also been studied in some detail. The book concludes with a bibliography with nearly a thousand items, followed by a short index of the families and genera mentioned in the text.

The whole affords an excellent example of work of an extremely useful order, which, moreover, requires no elaborate apparatus, and has the additional advantage that it can to a great extent be carried on out-of-doors.

A. B. R.

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*ARTICLES IN JOURNALS.**

Annals of Botany (June).—J. W. Snow, 'Pseudo-Pleurococcus, n. gen.' (1 pl.). — H. M. Ward, 'Thames Bacteria III.' (3 pl.).— O. V. Darbishire, '*Actinococcus* & *Phyllophora*' (1 pl.). — H. H. Dixon, 'The possible function of the Nucleolus in Heredity.'— W. H. Lang, 'Prothallus of *Lycopodium clavatum*' (2 pl.).

* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

Bot. Centralblatt (No. 23). — L. Adamovic, 'Neue Beiträge zur Flora von Serbien.'—(Nos. 24–26). H. Miche, 'Histologische und experimentelle Untersuchungen über die Anlage der Spaltöffnungen einiger Monokotylen' (1 pl.). — (No. 27). F. Hildebrand, 'Beobachtungen und Experimente an *Oxalis*-Arten.'

Bot. Gazette (20 May). — J. Donnell Smith, New Guatemala plants. — F. A. Waugh, 'Conspectus of *Lilium*.' — H. C. Cowles, 'Dune Floras of Lake Michigan' (concl.).

Bot. Zeitung (3–5 : 1 June).—G. Senn, 'Über einige coloniebildende einzellige Algen' (2 pl.).

Bull. de l'Herb. Boissier (31 May). — W. Barbey, 'Jardin botanique de Genève.'—J. Cardot, 'Flore mycologique de l'Amérique du nord' (concl.).—F. Stephani, 'Species Hepaticarum' (cont.).—H. Hallier, 'Monographie der Convolvulaceen' (cont.). — E. Fischer, 'Schweizerischen Rostpilze.' — R. Chodat, &c., 'Plantæ Hasslerianæ' (Paraguay : cont.).

Erythea (1 June : received 22 June). — A. Nelson, 'Western species of *Aragallus*.'*

Journal de Botanique (May : received 7 June). — A. Weber van Bosse, 'Notes sur quelques Algues' — E. Drake del Castillo, '*Wickstroemia Balansæ* & *Poortmannia speciosa*.' — L. Vidal, 'Le placenta des Primulacées.' — A. Franchet, Oaks of China. — L. Legré, 'L'herbier de Rauwolf à Leyde.' — A. de Coincy, 'Plantes nouvelles de la Flore d'Espagne.'

Oesterr. Bot. Zeitschrift (June). — J. K. Urumoff, 'Nachträge zur Flora von Bulgarien.' — V. Schiffner, 'Zur Lebermoosflora von Bhutan' (concl.). — K. Rechinger, 'Über die Trichome der Gesneraceen' (concl.). — K. von Keissler, 'Einige neue Missbildungen' (1 pl. : concl.). — C. Hofmann, 'Über *Scolopendrium hybridum*' (concl.). — V. Folgner, 'Zur Kenntniss der Entwickelungsgeschichte einiger Süsswasser-Peridineen' (cont.).

Rhodora (June).—G. T. Moore, 'Pollution of water-supplies by Algæ.'—M. A. Day, 'The Local Flora of New England.'

BOOK-NOTES, NEWS, &c.

At the meeting of the Linnean Society of London on May 4th, a paper by Mr. George West on Variation in Desmids was read. The *Desmidieæ* were shown to be morphologically specialized and to exhibit a marked pattern and symmetry of form, major and minor symmetries being recognizable in many species. Variations in form and symmetry were specially dealt with, and a summary given of all that is known concerning the variation in the cell-contents and in the conjugation of these plants. Observations were

* = *Spiesia* of American Check-list, etc. = *Oxytropis* auct. pl.

also made on the variability of the pyrenoids and moving corpuscles in the genus *Closterium*.

The author's conclusions were as follow:—(1) The structure of the cell-contents is one of the most constant features exhibited by a species, but one of little classificatory value owing to the large number of species which possess the same structure and arrangement of the chromatophores. (2) The outward form of the cell, as seen in front view, varies within certain limits, which are usually very small, but which may in exceptional cases be considerable. The form of the vertical view is, as a rule, a more constant feature than the form of the front view. (3) The ornamentation of the cell-wall is relatively constant, being always arranged according to a definite law, which is only transgressed by variations in one or more of the individual component groups which constitute the pattern of arrangement. (4) The prolific growth and rapid division of immense numbers of Desmids have a tendency to produce variations from the typical forms. (5) Slight changes in the conditions of environment cannot affect the characters of a species unless they act for long periods of time. Some remarks were added on interrelationships of the *Desmidieæ* deduced from a study of their variation, and certain species supposed to possess a close affinity were shown to have arisen along very different lines of evolutionary development. The paper concluded with a general account of the evolution of the genera of Desmids.

In a work of 257 well-printed pages, entitled *Die Alpen-Pflanzen in der Gartenkultur der Tiefländer* (Berlin: Gustav Schmidt), Herr Erich Wocke presents us with a valuable handbook on the culture of alpine plants. An introductory chapter on mountain climate is followed by a short *résumé* on the physiognomy of alpine species, and this by a discussion of the various soils suitable to, and of the effects of different soils upon, them. The conditions for successful cultivation of these plants are then dealt with, including such subjects as moisture, illumination, shortening of the vegetative period, protection against unfavourable conditions, and treatment according to habitat, three classes—"rock," "humus," and "half-humus" species—being recognised under the last heading. Chapters on pot-culture, propagation, and insect and other pests lead to well-illustrated accounts of the construction and planting of rockeries; and a list of alpine species suitable for cultivation, and which has the merit of showing at a glance the treatment to be followed in each case, brings to its close what seems to us a very creditable piece of work on an interesting branch of horticulture. A translation of Herr Wocke's book would doubtless be appreciated by English and American cultivators.

MM. Baillière et fils (Paris) publish a comprehensive *Bibliographie Botanique*, containing notices of about five thousand volumes, which they will send to any botanist on application.

The Report of the Watson Botanical Exchange Club for 1897–8 (published 1899) is largely devoted to notes upon Rubi and Roses by

the Rev. W. Moyle Rogers, but contains other matters of interest regarding the distribution of critical species, and notes by Messrs. Beeby, Marshall, Linton, and other botanists. We presume that there is some good reason for keeping this organization distinct from the older Botanical Exchange Club, otherwise it would seem that a union of forces would be in every respect advantageous.

Peter Gray, who died at Dumfries on June 3rd, was born at that place on Oct. 18, 1818. At an early age he adopted journalism as a career, and at length found his way to London, where he was at one time a familiar figure among amateur botanists. He had a good general knowledge of British plants, and a fairly representative herbarium. Gray contributed papers on Dumfries plants to the *Phytologist* (vols. i. (1842) and iii. (1848)), and sent marked catalogues to Mr. Watson, which were utilized by him for *Topographical Botany*. He also wrote the accounts of lichens and mosses for the "Young Collector" series of handbooks (1886).

We have received from Messrs. Warne & Co. the first number of the reissue of Anne Pratt's *Flowering Plants of Great Britain*, to which we referred last month. This was a useful book when it first appeared, nearly fifty years ago. At present it is, in matter and manner, hopelessly old-fashioned, and Mr. Edward Step's well-intentioned efforts to bring it up to date are far from successful. It is fair to say, however, that in still including such plants as *Epimedium*, he has been controlled by the plates, the existence of which no doubt is responsible for the reissue of the book. "The publishers cannot but feel that both printer and editor have been eminently successful, especially in that most conspicuous merit of accuracy in detail and colour." We are sorry that we cannot share their feelings.

Mr. James Fraser Robinson, of Hull, who is engaged upon a Flora of the East Riding of Yorkshire, points out that, owing to identity of initials, he is liable to be confused with the late James Frodsham Robinson, of Frodsham, Cheshire. It was to the latter that reference was made on p. 277 of our last issue.

The Rev. W. Moyle Rogers' *Handbook of British Rubi* will be published by Messrs. Duckworth in the autumn or early winter.

The Trustees of the British Museum have purchased the moss-herbarium of the Rev. H. G. Jameson, who has found himself constrained, owing to the increasing duties of his calling, to abandon the further pursuit of the hobby from which he has obtained such excellent results. It will be remembered that it was in this Journal in 1891 that Mr. Jameson gave to the world the firstfruits of his study—*Key to the Genera and Species of British Mosses*. Two years later he published his beautifully *Illustrated Guide to British Mosses*, which was in 1896 incorporated in the larger work—Dixon and Jameson's *Student's Handbook of British Mosses*. The herbarium contains some 1800 choice specimens arranged with characteristic neatness and care.

204 pp. Demy 8vo, Cloth extra, price 6s. 6d. net.

BIOGRAPHICAL INDEX

OF

Deceased British and Irish Botanists

BY

JAMES BRITTEN, K.S.G., F.L.S., & G. S. BOULGER, F.L.S.

"All persons interested in the history of botany and of the botanists of these islands, but more especially those actively engaged in botanical work involving historical research, will welcome a reprint of the 'Biographical Index,' which ran through four volumes of this Journal, beginning in 1888. . . . And this little book is, after all, the foundation, and a good substantial one, too, of the history of British and Irish botanists, which may some day develop into as complete and exhaustive a work as Colmeiro's admirable *La Botánica y los Botánicos de la Peninsula Hispano-Lusitana.* No other nation, I believe, possesses such a work as the latter, and no second nation, so far as I am aware, just such a work as the former."—W. Botting Hemsley in *Journ. Bot.*, Sept. 1893.

"The utility and general accuracy of this compilation were rendered evident in the course of its publication in the *Journal of Botany*, and the favourable impression then received is amply confirmed now that the Index appears revised and completed up to date."—*Athenæum*, Dec. 30, 1893.

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THE JOURNAL OF BOTANY

BRITISH AND FOREIGN.

EDITED BY

JAMES BRITTEN, K.S.G., F.L.S.,

SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM (NATURAL HISTORY).

CONTENTS.

	PAGE
Some *Oscillarioideæ* from the Plankton. By W. West, Jun., B.A. (Plate 400)	337
Apodachlya. By Antony Gepp, M.A., F.L.S.	338
Two Queensland Orchids. By A. B. Rendle, M.A., D.Sc.	339
Notes on the 'Flora of Kent.' By Arthur Bennett, F.L.S.	340
Notes on *Malvariscus*. By Edmund G. Baker, F.L.S.	344
Hepaticæ of Moidart, West Inverness. By Symers M. Macvicar	348
On the Probable Status of some Irish Plants. By the Rev. E. S. Marshall, M.A., F.L.S.	356
Short Notes. — *Alopecurus pronus* Mitten. — *Epipactis atrorubens* Schultes. — *Selinum Carvifolia* L. — *Thesium humifusum* DC. in E. Kent.—*Arenaria balearica*.—*Hypnum Wilsoni* in Lincolnshire. — A Hybrid Orchid. — Cheshire Plants. — Form of *Asplenium Ruta-muraria*. — *Sagina apetala* in Westerness?—Kentish Plants	358
Notices of Books:—	
A Text-book of Plant Diseases. By George Massee, F.L.S. ..	362
De Genere Malpighia. By Prof. F. Niedenzu	363
Die Kontinuität der Atomverkettung ein Strukturprinzip der lebendigen Substanz. Von Dr. Georg Hormann	364
Articles in Journals	366
Book-Notes, News, &c.	367

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THE JOURNAL OF BOTANY was established in 1863 by Dr. Seemann. In 1872 the editorship was assumed by the late Dr. Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

Without professing to occupy the vast field of general Botany, the Journal has from its inception filled a position which, even now, is covered by no other periodical. It affords a ready and prompt medium for the publication of new discoveries, and appears regularly and punctually on the 1st of each month. While more especially concerned with systematic botany, observations of every kind are welcomed. Especial prominence has from the first been given to British botany, and it may safely be said that nothing of primary importance bearing upon this subject has remained unnoticed.

Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains. Many important monographs and other works first appeared in its pages. In 1896 it became necessary to increase its size, owing to the number of papers sent for publication: the number of plates was at the same time augmented.

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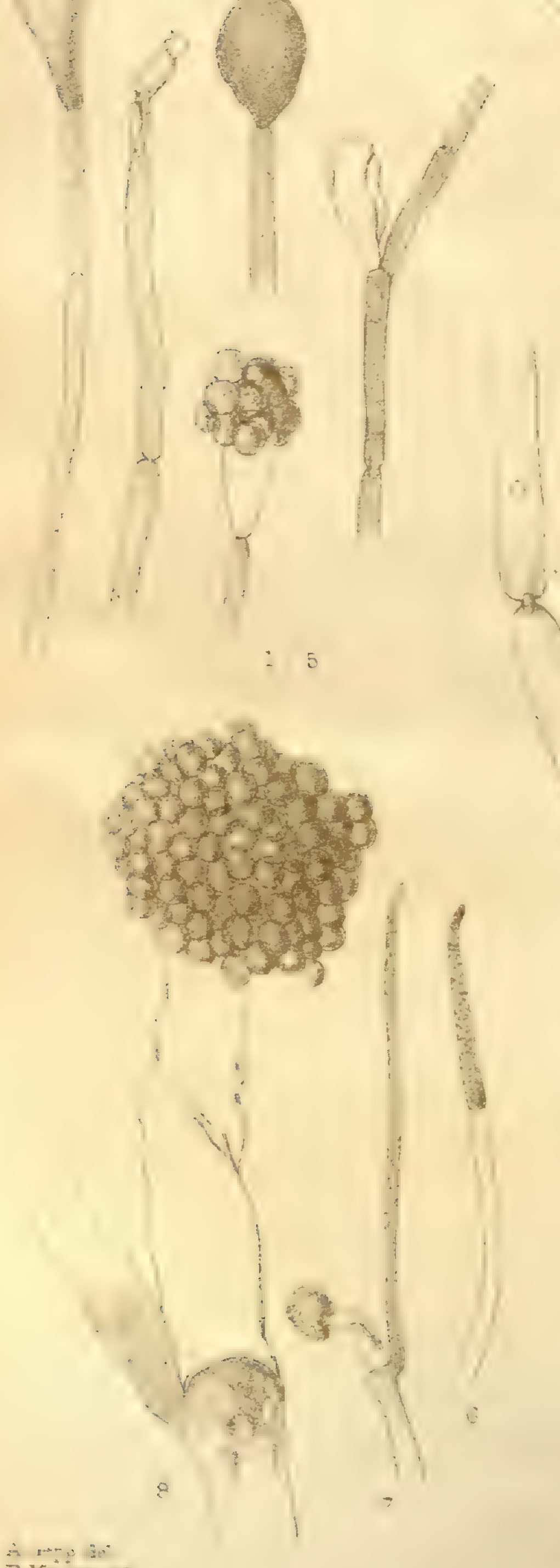
W. West f. del.



A. Oscillatoria capitata Wes. et
1-5 Apodachiya. 6-13. Achiya. 14. Apodya.

SOME OSCILLARIOIDEÆ FROM THE PLANKTON.

By W. West, Jun., B.A.

(Plate 400 A.)

In most of the collections made by Messrs. Murray and Blackman during their voyage to the West Indies on the 'Para' in 1897, there were several species of this group. They did not occur with any great regularity over the whole track, sometimes one or the other predominating.

Trichodesmium Thiébautii Gomont, 'Essai de classification des Nostocacées homocystées,' in Morot, *Journal de Botanique*, iv. 356 (1890). Diameter of trichomes 7–12 μ; length of articuli 9–22 μ. Most of the specimens seen resembled Gomont's fig. 4 (*Monographie des Oscillariées*, pl. vi.) rather than his fig. 3.

Hab. Canary Islands (*Thwaites*); Guadeloupe (*Thiébaut*).

Oscillatoria Bonnemaisonii Crouan, in Desmaz. Pl. cryptog. de France, 2e série, no. 537 (1858). Diameter of trichomes 38–43 μ; length of articuli usually 4·5–8·7 μ (rarely 11–12 μ). The great majority of the specimens seen were not in any way torulose.

Hab. W. coast of France (*Debray*, *Thuret*, *Crouan*); and shores of the Adriatic (*Hauck*).

O. miniata Hauck, *Die Meeresalgen Deutschlands und Oesterreichs*, 508 (1885); Gomont, *Monographie des Oscillariées*, 236 (1893). Diameter of trichomes 14–19·5 μ; length of articuli usually 5·5–9·5 (rarely 9·5–11) μ.

Hab. The Adriatic (*Zanardini*, *Hauck*); Guadeloupe (*Mazé & Schramm*).

O. nigro-viridis Thwaites in Harvey, *Phycologia Britannica*, *Synopsis*, p. xxxix, no. 375, pl. 251, A (1846–1851); Gomont, *l. c.* 237, pl. 6, fig. 20 (1893). Diameter of trichomes 7–10·2 μ; length of articuli 4–5·8 μ.

Hab. Scotland (*Batters*); France (*Le Jolis*, *Thuret*, *Crouan*, *Flahault*); Istria (*Agardh*, *Hauck*); United States (*Collins*).

O. capitata West fil., nov. sp. (Plate 400 A). Trichomes free or agglomerated into a slender stratum, fragile; sometimes spirally coiled and twisted, at others arcuate or even nearly straight, sub-torulose; slightly attenuated towards the capitate apex. Articuli usually twice, but up to three times, as broad as long; dissepiments not granulated; protoplasm homogeneous or sparingly granulose. Apical cell capitate, furnished with a more or less convex and closely-appressed calyptra. Diameter of trichomes 9·6–11·9 μ; length of articuli usually 4–6·5 (rarely 3·3–8·5) μ; maximum diameter of apical cell 6·9–9·1 μ; length of apical cell 6·7–8·1 μ; diameter of constriction in apical cell 3·6–8 μ.

Lat. 23° 44′ N.; long. 45° 30′ W.

This is a well-marked but variable plant. In one case two or three trichomes, each of which formed an irregular spiral, were interwoven into a rather confused mass. When many filaments were agglomerated, they were either straight or simply arcuate. There was no trace of granulation in the dissepiments, save in those between disintegrating articuli. The calyptra was so closely appressed as to form an apparent incrassation of the membrane. Colour unknown, the specimens having been treated with chromic acid.

The only marine species with which *O. capitata* can be confounded are *O. miniata* Hauck and *O. margaritifera* Kütz., both of which are as a rule larger. The much narrower cells and the nature of the dissepiments easily distinguish the latter species from *O. capitata*. The very marked apical cell and considerable variation in the trichomes distinguish *O. capitata* from *O. miniata*.

APODACHLYA.

Realizing the scarcity of illustrations of *Saprolegniaceæ* in our British Handbooks, the Editor has been good enough to devote part of Plate 400 to some figures of the fungi which were treated of in this Journal—pp. 198–200. These plants were, it may remembered, found growing on a floating broomstick in Shropshire. All the figures but two (6 and 7) are magnified to the same degree—288 diameters.

Antony Gepp.

Explanation of Plate 400.—Figs. 1–5. *Apodachlya pyrifera* Zopf. Two nearly mature sporangia flanking a collapsed sporangium. Below is an empty sporangium crowned with the encysted zoospores which have been extruded from it. On the right is an empty sporangium partly pushed aside by the outgrowth of the branch from beneath it. Fig. 6 (× 44 diam.). *Achlya racemosa* Hildeb. A nearly ripe terminal sporangium. Fig. 7 (× 44 diam.). Ditto. Empty sporangium with mass of encysted zoospores attached to apex, and young innovating branch growing out below. Fig. 8. Ditto, more highly magnified. Fig. 9. Ditto, oogonium and two antheridia. Fig. 10. Ditto, four oospores. Fig. 11. *Achlya racemosa* var. *stelligera* Cornu. Oogonium with two oospores and an antheridium. Fig. 12. *Achlya spinosa* De Bary. Oogonium with one antheridium. Fig. 13. Ditto, three oogonia without antheridia. Fig. 14. *Apodya lactea* Cornu. Portion of hypha showing constrictions and cellulin-bodies.

400A. *Oscillatoria capitata* West fil.

TWO QUEENSLAND ORCHIDS.

By A. B. Rendle, M.A., D.Sc.

Mr. J. Sparkes, to whose Queensland correspondent we owe the *Cymbidium Sparkesii* described in this Journal for 1898 (p. 221), has recently flowered two other interesting Orchids received from the same source. One is evidently *Eria Fitzalani* F. Muell. (in Wing's *Southern Science Record*, ii. 253), no specimens of which seem hitherto to have reached this country. It was the first *Eria* known from Australia, and the original locality, Mulgrave River, is only about twenty-five miles north of Johnstone River, from the neighbourhood of which Mr. Sparkes' specimens came. As Mr. F. M. Bailey described a second species of the genus from Johnstone River in 1886, this seems a good hunting ground, and we shall hope for more interesting plants. Dr. Mueller's description of *Eria Fitzalani* was admittedly made from imperfect specimens, and no measurements are given. The following additional notes from Mr. Sparkes' plant may therefore be useful:—

Eria Fitzalani F. Muell. Raceme 8 in. long; flowers $\frac{1}{3}$ in. from front to back, sepals 5-nerved, the dorsal oblong with rounded apex, $4\frac{1}{2}$ lines long by barely 2 lines broad, the lateral triangular-ovate from a broad base, very blunt, 4 by $2\frac{1}{4}$ lines; lateral petals narrowly oblong, narrowed at the base, with rounded apex, $4\frac{1}{2}$ lines long by scarcely $1\frac{1}{2}$ lines broad; lip strongly curved, 4 by $2\frac{1}{4}$ lines; column $1\frac{1}{2}$ line long, foot 2 lines; pollen-masses lemon-yellow. Pseudobulb obliquely conical, shortly narrowed at the base; the largest 5 in. long and 4 in. in circumference above the base. Leaves lanceolate, subacute, with about 11 nerves; an average specimen $5\frac{1}{3}$ in. long by 1 in. broad.

Bulb sent by Mr. Arthur O. Jones, J.P., of Geraldton, Johnstone River, N.E. Queensland. Flowered at Ewhurst, Surrey, by Mr. J. Sparkes, March, 1899.

The second is a *Dendrobium* with a small dense raceme of beautiful fleshy dead-white flowers, the perianth-segments tipped with green, and the lip with a somewhat hood-like polished green apex. The white column is margined with green, the stigma is green, and the anther-cap green with a pair of dull crimson spots at the front base, and a coral-pink margin; the pollinia are reddish. It is very near *D. Hollrungii* Kränzl., from New Guinea (Kaiser Wilhelms-land), the flowers of which, however, are larger and sulphur-yellow in colour, with a fuscous-tipped lip. We may consider it as an Australian variety of the type.

D. Hollrungii Kränzl. var. australiense, var. nov. Flowers one-third smaller than in the type, dead-white tipped with green.

Geraldton, Johnstone River, N.E. Queensland. Flowered by Mr. J. Sparkes at Ewhurst, Surrey, May, 1899.

Mr. Sparkes says: "Its largest pseudobulb is 24 in. long, and $\frac{7}{8}$ in. in diameter. There are twenty-nine leaf-scars. Other bulbs are 20 in. long, and have twenty-three scars. The growth reminds one of *D. nobile*." He sends a leaf which is ovate-lanceolate, subacute, and measures $4\frac{3}{4}$ by $1\frac{1}{2}$ in.

NOTES ON THE 'FLORA OF KENT.'

By Arthur Bennett, F.L.S.

The publication of the above-named *Flora* by Messrs. Hanbury and Marshall enables us to see what has been done, and what has still to be undertaken, in one of the most interesting of the southern counties. I give a few notes on some of the most interesting of the species that seem additional to what is there printed, though, as the authors doubtless rightly say, the matter is condensed from a great mass of material.

There are one or two Surrey plants omitted from the comparative lists of the five counties given in the introduction. *Dianthus deltoides* occurred in some plenty near Croydon, but is now all but extinct, though protected by the owner. Large tufts were formerly taken up for gardens. *Medicago denticulata* is also a Surrey species, though perhaps not on so good a basis as the Kent plant. *Lathyrus palustris* did occur in Surrey, though it has long been extinct. *Verbascum virgatum* is quite as much a Surrey as a Kent species. *Orchis purpurea* and *O. militaris* have both occurred in Surrey; specimens are in herbaria. *O. Simia* has not been found for many years. *Juncus obtusiflorus* may have the "?" removed from Surrey; I have gathered it. *Potamogeton angustifolius* (*Zizii*) is a Surrey plant.

The following notes bear upon the published Flora.

Ranunculus Baudotii Godron. 10. This may be studied in a great variety of forms in the Military Canal. *R. sardous* Crantz. 2. Swanscombe Marsh, Reeves; very fine. 3. Seasalter Level; 1 inch high (*parvulus* L.). *R. parviflorus* L. 4. Near Reculvers. W. F. Miller, specimen.

In fields between Bush and Halling the three Fumarias, *densiflora*, *Vaillantii*, and *parviflora*, may be seen growing abundantly, and the differences can be well studied.

Arabis hirsuta Scop. 5. Cliffs by S. Foreland. Beeby!.

Cochlearia anglica L. var. *gemina* Hort, ex Babington, Man. Brit. Bot. ed. 3, 27 (1851); (var. *Hortii* Syme in Ex. Club Rep. 1872–4, p. 9 (1875)). 1. Plumstead Marshes; Woolwich. These specimens are the same as specimens named *Hortii* by Syme for Cheshire. Syme remarks: "The form from the north of England I propose to call var. *Hortii*, as it appears to be the plant which the Rev. F. Hort considered the type of the species. . . . What I consider the type of the variety is sent by Mr. Robert Brown from the 'muddy shore of the river Mersey, Birkenhead, Cheshire, July, 1873.' . . . The radical leaves are oval, tending towards ovate rather than obovate, abrupt or rounded at the base, and the pods considerably shorter, often not more than a quarter of an inch long, broader in proportion than var. *gemina*, and having the broadest part in the middle, and not at all towards the apex." See also Exch. Club Rep. for 1875 (1876) for further remarks by Dr. B. Syme. I think Meyer's var. *stenocarpa*, Chloris Hannov. p. 136 (1836), is the same as var. *Hortii*. Excellent remarks on *Cochlearia* will be found in Nolte's Nov. Fl. Holsat. pp. 56–63.

Buda media Dum. (*Spergularia marginata* Syme). In 1876 I gathered at Hay Cliff, near Dover, a specimen of this with thickly glandular calices and pedicels, very crowded leaves and woody root, but the seeds were all surrounded by a wing. Although Syme says "whole plant glabrous," the E. B. plate shows the calyx and pedicels thinly hairy. Many authors say nothing as to armature, but Lange has "whole plant glabrous." In the Hay Cliff plant the stipules are much larger and whiter; in fact, the plant had quite the facies of *rupestris*. It seems to be the *Spergularia halophila* γ *media* f. *macrantha* of Marsson, Fl. v. Neu-pommern, p. 77, 1869. Lönnorth's var. *fascicularis* (1854) must be near this. Syme mentions (Eng. Bot. ed. 3, v. 2, p. 133 (1864)) that *B. rupestris* was first introduced among British plants in the *London Cat. of Brit. Plants*, ed. 5, p. 2 (1857). This seems to be the case, so far as the name is concerned; but I think there cannot be much doubt that the plant is well described in the *Phytologist*, iii. p. 321 (1848), by the Rev. F. J. A. Hort under "*Alsine rubra* var. *media* Bab." He says he had seen it in Devon.

Arenaria tenuifolia L. 2. Field near the Mill, Plumstead Common. July, 1845. Dr. Bossey.

Hypericum hircinum L. 1. Just within the county of Kent from Croydon road to Wickham; plentiful in a shrubbery.

Trifolium ochroleucon Hudson. The authors seem to place more faith on Cooper's *Flora Metropolitana* than did Mr. Watson, who describes it as a "mass of confusion and blunders." Certainly no vice-county can stand on its authority alone, unless verified by specimens.

Agrimonia Eupatoria L. 5. On the undercliff near St. Margaret's Bay there occurs a variety of this plant simulating *A. odorata*. It seems to accord with the var. *sepium* Brébisson, Fl. Normandie, ed. 4, p. 110 (1869), and with β *umbrosa* Coss. et Germ. Fl. Paris, p. 182 (1845).

Hippuris vulgaris L. 5. Between Walmer and Kingsdown.

Artemisia maritima L. 5. Of the three forms we possess, I have only seen that which is generally placed to *genuina* between Sandwich and Pegwell Bay. Of that placed to *gallica* (considered a distinct species by Nyman), the difference, though not great, seems constant. The Linnean plant, Sp. Pl. i. 846 (1753), seems to cover this. That usually called *salina* Willd. (Sp. Pl. iii. 1834 (1800)) (*A. maritima* β *suffruticosa* Hartm. Handb. Skand. Fl. ed. 1, 301 (1820)) I have gathered in several places on the Kentish coast. Nyman queries "Angl." for his *maritima* L., but the Kentish plant is the same as specimens named by Scandinavian authors.

Petasites fragrans Presl. 1. Abundant at Lewisham near the railway station, and thence towards Deptford by the footpath leading past the West Kent Waterworks.

Arctium intermedium Lange. 1. On the borders of the county between Wickham and Addington. I am glad Mr. Webb mentioned that his *nemorosum* was that of Newbould (hence also of Babington), as continental authors seem now to consider that *nemorosum* Lejeune

= *intermedium* Lange. I doubt this much. Anyhow Newbould's *nemorosum* is distinct enough from Lange's *intermedium*. Nyman, in his *Supplement*, puts *A. pubens* Bab. as a subspecies of *A. tomentosum;* but it belongs to *intermedium*, as specimens in his herbarium show. No British or Irish specimens I have seen can be assigned to *A. tomentosum* Schkuhr. The Eng. Bot. plate, t. 701, ed. 3, does not represent Newbould's plant, but is *intermedium* Lange.*

Tragopogon pratensis L. γ *grandiflorus* Syme, E. B. ed. 3, v. 139 (1866), In *Phytologist* (i. pp. 35-38 (1841)) Mr. Irvine remarks that at Cobham occurs a form of *Tragopogon* which Mr. Pamplin had observed there for several years. At p. 94 Babington says: "I have not the slightest doubt that [it] is the true *T. pratensis* of Linnæus and Smith (Eng. Bot. t. 434)." This is the plate reproduced in Eng. Bot. ed. 3, t. 800, and is accepted by Syme (p. 139) as his var. *grandiflorus*. In the second edition of his *Manual*, p. 189 (1847), Babington notes it "form b.," and this designation is still retained in the eighth edition (1881). One of the stations given in the *Flora of Kent* must be expunged; that of "Rodmersham, Stowell (Phyt. N s. i. 334):" Mr. Stowell says that this had "the involucre about one-third longer than the florets," which would place it between *genuina* and *minor*, and answers to the plant named *T. major* in Hooker's *Brit. Fl.* p. 344 (1835) (non Jacq.). If the name *grandiflorus* be retained, it must be quoted as of Doell (*Rheinische Flora*, p. 538 (1843)); but the adoption by Meyer (Chloris Hannov. p. 434 (1836)) of the same name for *T. orientalis* L., which he considers a var. of *pratense*, and the suggested reduction of *T. grandiflorum* Saut. by Nyman under *T. pratense*, seem to render this undesirable.

Pyrola minor L. 7. Woods near Stouting. Reeves, 1883 !.

Statice rariflora Drejer. Watson quotes a specimen from Syme for West Kent in Top. Bot.; the stations given are in East Kent.

Orobanche caryophyllacea Smith. This occurs on *Galium Mollugo*, *G. verum*, and *Lotus corniculatus*, and, Syme says, on *Rubus fruticosus;* but I never could trace the connection with this. It begins to flower the second week in May. *O. Hederæ* Duby. 7. At the edge of Abbot's Cliff, near Dover. *O. amethystea* Thuill. 7. At the base of the Shrimpers' Steps by Abbot's Cliff, this pretty species sometimes occurs by hundreds. I have gathered it on *Daucus Carota* (*O. Carotæ* Desmoul.)? and on *Ononis repens* in Kent. *O. minor* Smith. 2. Near Strood, G. Nicholson !.

Atriplex laciniata L. 4. Between Ebbsfleet and St. Lawrence; now become rare. The f. *parvifolium* Moq.-Tand. occurs on the Kentish coast. *A. pedunculata* L. 4. In this district sometimes abundant, then for a few years scarcely to be found without very close searching, and then often only 1 inch high. When abundant, specimens 8 inches high are not uncommon. It was especially abundant in 1874.

Polygonum Persicaria L. 4. A prostrate stout form occurs

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* If it should prove that continental plants are conspecific, ours might be named *A. Newbouldii*.

between Pegwell Bay and Ebbsfleet Gate among *Atriplex littoralis* and *laciniata*. It seems to be the var. *prostratum* Bréb. Fl. Norm. p. 271 (1869).

Rumex crispus L. var. *trigranulatus* Boswell, Ex. Club Rep. p. 37, 1872–4 (1875). I have gathered this along the Kentish coast between Deal and Dover in several places. I suppose it to be the same as a plant named var. *littoreus* by Mr. Hardy in 1849.

Malaxis paludosa Swartz. 8. This was rediscovered at Hurst-hill, Tunbridge Wells, in Aug. 1844, by Messrs. Sharp and Woodward: *Phytologist*, ii. 42.

Cephalanthera ensifolia Rich. I have a specimen gathered by J. E. Stocks, "July, 1842; Cobham, Kent."

Orchis purpurea Huds. Near "Debtling (Detling), Kent, 1854; A. O. Black." This may be in district 8 if on the southern slope. The plant recorded in *Science Gossip*, Sept. 1887, as "*O. militaris*" was *O. purpurea*. "Found in 1759 in bushy dry banks going to Greenford (*sic*) Green, near to Dartford; also near the great beech trees, so remarkable a landmark in Kent, as you go to Sevenoaks: this in 1758, and it flowered finely in my garden at Mill Hill in 1760." Peter or Michael Collinson, quoted in Phyt. v. 172, N. S.

O. hircina Scop. 8. "Near Maidstone, July, 1875, two specimens were found by me," Prof. Tempère: I possess one of these; it was again found in 1877. "I never saw it but once, and that was a little beyond Dartford, on the road to Greenstreet Green, very sparingly. . . . My father formerly removed into his garden at Peckham this curious plant, and it flowered there with him for several years. The place whence he got it was near to the fourteenth milestone, just before you come to Dartford Heath, which spot is since entirely demolished by enlarging the road. We found it since in Heath Lane and in Stanhill chalk-pit. . . . In May of the year 1767, I found [several plants] in an old chalk-pit near Dartford Heath. . . . . There had been a destroyer in the same pit a little before me, who had (by the holes in the turf) carried away with him in full flower near seventy roots, most of which would undoubtedly perish, and thus this species of *Orchis* rare to be met with here for the future." Michael Collinson MS., *l. c.*

Ophrys aranifera Huds. 7. Abundant on Hay and Abbot's cliffs, and often by hundreds at the foot of the Shrimpers' Steps near Abbot's Cliff.

Juncus acutus L. 4. Still in the Rev. G. E. Smith's station, with *J. maritimus*.

Potamogeton obtusifolius Mert. & Koch. 8. Ponds at Leigh, near Tunbridge, 1881.

Weingærtneria canescens Bernh. 7. I have little doubt the plant supposed to be this species was a form of *Agrostis* which grows between Dover and Folkestone; it simulates the rarer species, and might well have been mistaken for it.

Festuca uniglumis Soland. There is a East Kent specimen in Dalton's herbarium at York.

Equisetum hyemale L. I have seen specimens from East Kent.

NOTES ON MALVAVISCUS.

By Edmund G. Baker, F.L.S.

Captain J. Donnell Smith, in *Primitiæ Floræ Costaricensis*,* enumerates five species of *Malvaviscus* as occurring in Costa Rica, among them *M. arboreus* Cav. As I am doubtful whether some of the plants referred here are correctly so placed, I have endeavoured to compare, as far as possible, the material upon which this species is founded, and also to see authentic specimens of the several varieties which have been made by Schlechtendal and Grisebach.

Malvaviscus arboreus Cav. Diss. iii. 131, t. 48, fig. 1, is founded on Cavanilles' description and plate and the following synonyms:—

M. arborescens flore miniato clauso, Dill. Elth. 210, t. 170, f. 108.
Hibiscus foliis cordatis, crenatis, angulatis lateralibus extimis parvis, caule arboreo, Hort. Cliff. 349.
Hibiscus frutescens foliis angulatis, cordatis, acuminatis, petalis ab uno latere auritis. Browne, Jam. 284.
Alcea indica arborea, folio molli, flore amplo eleganter coccineo. Pluk. Alm. 14, t. 257, fig. 1.

Cavanilles' diagnostic phrase is "M. caule arboreo, foliis cordatis, crenatis, acuminatis, tomentosis." and there is a specimen existing in his herbarium in Madrid, which, through the kindness of Prof. Colmeiro, I was able to consult. The leaves are tomentose, cordate, subtrilobed (middle lobe longest), lamina 2 in. long, petioles 1–1¼ in. long. Bracts strap-shaped, acute. Petals ½–⅔ in. long. Staminal tube exserted ¼ in. Peduncle ⅜ in. long.

I think this plant is identical with that of Dillenius and Plukenet,† and that it is inseparable from *M. mollis* DC. (*Achania mollis* Aiton, Hort. Kew. ii. 459 (1789)). *M. arboreus* Grisebach (*Fl. Brit. West Indies*, 83) is a different plant, though perhaps not specifically distinct. The synonymy of the type and varieties appears to be as follows:—

Malvaviscus arboreus Cav. Diss. iii. 131, t. 48, fig. 1; DC. Prod. i. 445 (1824), in part. *M. arborescens*, &c., Dill. Elth. *l. c.* *Alcea indica*, &c., Pluk. Alm. *l. c.* *Hibiscus Malvaviscus* L. Sp. Pl. ed. 1, 694 (1753), in part. *Achania mollis* Aiton, Hort. Kew. ed. 1, ii. 459 (1789). *Malvaviscus mollis* DC. Prod. i. 445 (1824). Leaves cordate, generally subtrilobed, middle lobe longest, softly tomentose. Bracts strap-shaped or somewhat patulous. Petals 6–12 lines long.

Grisebach's remark on the shortly exserted column of *M. mollis* DC. is due, I think, to some slight misconception, as in the type of this plant it is very nearly but not quite double the length of the petals.

M. mollis DC. only differs from the specimen in Plukenet's herbarium by the leaf-lobes being rather more divaricate and rather more softly tomentose. The type comes from Mexico.

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* Tome ii. fasc. 1 (1898), p. 45.

† Plukenet's and Aiton's types are in the National Herbarium.

There are a number of plants in herbaria which have been referred to this species, but are difficult to place either under the type or under any of the varieties. *Berlandier* No. 566, from Mexico, closely approaches the type, but the flowers are larger than the measurements given above, and there are other slight differences. A very similar plant is *Seemann* No. 1238, from Panama.

Var. SLOANEI. *M. arboreus* Grisebach, *l. c.* *Malva arborea*, &c., Sloane Cat. 96; Hist. i. 216, t. 136, fig. 1. *Achania Malvaviscus* Swartz, Prod. 102; Flora Ind. Occ. ii. 1222 (excl. syn.). Leaves cordate, generally rather large, longer than broad, margin crenate or subentire, sometimes obsoletely 3–5-lobed, above somewhat scabrid. Column twice as long as the corolla. "Berry yellow."

The type comes from Jamaica. This is in all probability the plant of Browne's *Jamaica*, p. 284; specimens of Sloane's plant are preserved in his herbarium, vol. iv. f. 45.

The plant gathered by Dr. Edward Palmer in Mexico, Manzanillo, No. 963, is closely allied to the above, and the gathering from Tepic, No. 1955, is very far removed from the type of *M. arboreus* Cav., but more nearly approaches this variety. The latter differs in its very strongly serrated margins to the leaves. *Donnell Smith* No. 882, from Pansamala, Dept. Alta Verapaz, Guatemala; *Donnell Smith* No. 1991, from Escuintla, Dept. Escuintla, Guatemala; *Donnell Smith* No. 5719, from Cartago, Costa Rica; and *Kerber* No. 17, from Cordoba, Mexico, will probably all have to be referred here.

The three following varieties have been described by Grisebach, *l. c.* p. 83:—

Var. GRISEBACHII (*M. arboreus* var. *α*, Griseb. *l. c.*). Branches and petioles hairy; leaves not scabrid to touch, with a minute scattered down or sometimes subglabrous, generally unlobed. Bracts narrow, ciliate, erect, slightly exceeding calyx. Petals 1–1½ in. long.

The type comes from Jamaica.

Var. PARVIFLORUS. Branches and petioles villous-tomentose; leaves softly and canescently tomentose below, thus easily distinguished from the preceding, which is not so. Bracts narrow, spreading, canescent-tomentose (not merely ciliate at margin, as is usually the case in var. *Grisebachii*), nearly equalling calyx. Petals 10–12 lines long. Descourt, Fl. vi. t. 383.

M. pilosus Macfad. *fide* Grisebach (excl. syn. Swartz).

The type comes from Jamaica. Specimens from Grisebach of this and preceding are in Herb. Kew.

Var. SAGRÆANUS Rich. Cub. 131, t. 14 (as species). Branches glabrate; petioles with appressed down; leaves pointed, glabrate. Bracts suberect, nearly equalling calyx. Petals 8–10 lines long.

The type comes from Cuba: it also occurs in Bahamas.

Bernoulli & Cario No. 3110, from Guatemala, is allied to this variety, but the leaves are broader.

Schlechtendal, in *Linnæa*, xi. 359–360 (1837), describes the two following varieties;—

Var. MEXICANA Schlecht. Leaves above scabrid with a minute stellate pubescence, below sometimes nearly glabrous, sometimes with rather large stellate hairs. Peduncles with only short pubescence. Flowers an inch longer.

Hab. of type. Tampico de Tamaulipas, *Berlandier* 1827, herb. Kunze; near Vera Cruz, *G. Schiede*; near Mexico, *Hegewisch*, herb. Lehmann.

C. G. Pringle No. 4923, from Valley of Oaxaca, is nearer to this variety than to the type.

Var. CUBENSIS Schlecht. Leaves on both sides smooth or nearly so. Peduncles covered only with a short pubescence. Flowers $\frac{3}{4}$ in. long. Staminal column twice as long as corolla.

Hab. of type. Cuba, *Poeppig.*, herb. Kunze.

This variety is probably identical with var. *Sagræanus*. The plant is represented in the National Herbarium from Cuba by a specimen from Poeppig, and by *C. Wright* No. 2064.

The Costa Rican plants of Tonduz which have been referred to *M. arboreus* by Capt. Donnell Smith, which are represented in the National Herbarium, are Nos. 2218, 8977, and 9030. None of these appear to me to represent the type of this plant, though two of the above may fall here as forms or varieties of this very polymorphous species. I add a description of a plant collected in Costa Rica by Dr. Polakowsky, which I have been unable to identify; of another from Honduras, collected by Rev. John Robertson, S.J., and of a third, the name only of which has been published. No. 2218 must be closely allied to the first of these, which differs from *M. arboreus* by having leaves about four times longer than broad, with a margin irregularly and grossly crenate-dentate.

Malvaviscus Polakowskyi, sp. nov. Frutex vel arbuscula ?; ramulis pilis pubescentibus; foliis petiolatis laminis oblongis, ± 4-plo longioribus quam latis, basi rotundatis, apice subacuminatis, margine irregulariter et grosse crenato-serratis supra pilis sparse conspersis subtus pilis densius conspersis; floribus pedunculatis; involucro ± 8-phyllo, foliolis linearibus, margine pilis ciliatis, calyci subæquilongis; calyce campanulato laciniis ovatis; petalis quam calyce 3–4-plo longioribus erectis, apice rotundatis; tubo stamineo exserto; carpidiis in sicco saturati-rubris.

Hab. Costa Rica, *Polakowsky*, No. 197.

Shrub or small tree?; branchlets with patent tawny hairs. Leaves oblong, margin irregularly and grossly crenate-dentate, apex subacuminate, sparsely hairy above, more hairy beneath especially on the veins, 3- or sub-5-veined at the base; lamina 5·5–8 cm. long, 1·5–2 cm. broad; petiole often about 1·5 cm. long, patently hairy. Flowers axillary, peduncles ± 1·5 cm. long, patently hairy. Bracts narrow, about as long as the calyx. Calyx ± 12 mm. long, sparsely hairy externally; segments ± 5 mm. long, with a tuft of hairs near the apex. Petals ± 3·8 cm. long. Staminal column exserted about 2 cm. Fruit when dry of a dark red colour.

As has been already stated, the plant collected by Tonduz, No. 2218, "bords du Rio Ciruelas," 15. iii. 1890, is evidently closely allied to the above.

Malvaviscus brevibracteatus, sp. nov. Frutex vel arbuscula ?; ramulis superne minute stellatim pubescentibus, inferne glabris; foliis petiolatis oblongis vel ovato-oblongis haud lobatis 2–3-plo longioribus quam latis, basi rotundatis vel subcordatis, apice acutis, margine irregulariter undulatis vel crenato-undulatis utrinque minute stellato-pubescentibus cum pilis stellatim et sparsim intermixtis; pedunculis strictis axillaribus solitariis; involucro 6–7-phyllo, quam calyce breviore, phyllis linearibus, margine pilis ciliatis; calyce campanulato haud ad medium quinquefido, laciniis ovatis acutis; petalis quam calyce 2–3-plo longioribus; tubo stamineo quam petalis fere duplo longiore.

Hab. Honduras, Belize, Stann Creek, *Rev. John Robertson*, Nos. 34 and 35. In flower and fruit, Dec. 27th, 1899.

Shrub or small tree? Leaves petiolate, lamina oblong or oblong-ovate, unlobed, 4–6 cm. long, 1·5–3·0 cm. broad, petiole often about 1 cm. long, lamina minutely stellately pubescent, and also some scattered stellate hairs, margin undulate or undulate-crenate, apex acute, base rounded.

Flowers axillary, solitary. Peduncle strict, ± 1·3 cm. long. Bracts linear, shorter than the calyx, ± ·5 cm. long. Calyx 7–8 mm. long, segments ovate or triangular-acute, canescently pubescent internally. Petals ± 2·0 cm. long, scarlet. Staminal column ± 3·7 cm. long, thus not quite twice as long as the petals. Carpels ± ·5 cm. high, when dried of a deep red colour.

The noticeable features of this plant are the unlobed oblong or oblong-ovate leaves (which are not soft to the touch, as in the type of *M. arboreus* Cav.), and the rather small flowers with short bracts.

M. CINEREUS Bak. fil. in Amer. Journ. Sci. L. 176 (1895), nomen. Frutex vel arbuscula?; ramulis superne pilis stellatis pubescentibus, inferne glabrescentibus. Foliis petiolatis, laminis palmatim 3–5 acute lobatis supra cinereo-pubescentibus subtus pilis majoribus stellatis conspersis, cordatis, margine irregulariter serratis; floribus in racemum terminalem dispositis et in ramulis axillaribus; involucro ± 10-phyllo foliolis subulatis canescenti-pubescentibus quam calyce longioribus; calycis laciniis triangularibus acutis vel subacuminatis; petalis quam calyce 2–3-plo longioribus extus pubescentibus cuneato-obovatis, apice rotundatis; tubo stamineo exserto; stigmatibus capitellatis; carpidiis dorso strigoso-pubescentibus.

Hab. Mexico: Tepic, *Dr. Edward Palmer*, No. 1990. In flower and fruit, Jan. 5–Feb. 5, 1892.

Shrub or small tree? Branches stellately hairy towards extremities, below glabrescent. Leaves petiolate, lamina palmately 3–5 acutely lobed, cordate, margin irregularly serrate or crenate-serrate, above closely cinereously pubescent, below rather lighter and together with the close tomentum are longer stellate hairs, lamina 7–11 cm. long, 9–12 cm. broad, petiole 3·5–5·0 cm. long, more or less cinereously hairy. Flowers in terminal and lateral racemes, which give this plant a very distinct appearance. Racemes dense above, laxer below. Bracts subulate, longer than the calyx, cinereous pubescent, often twisted or turned near apex.

Petals cuneate-obovate, pubescent externally, ± 1 cm. long. Carpels strigose pubescent on the back, ± 9 mm. long, ridged in the middle of the back.

The cinereous palmatilobed leaves, the racemose inflorescence, and the rather small flowers with subulate bracts, constitute the distinguishing characteristics of this species.

HEPATICÆ OF MOIDART, WEST INVERNESS.

By Symers M. Macvicar.

Moidart forms the extreme south-west corner of the county of Inverness in latitude 56° 50′, and, bordered as it is by the Atlantic, has a mild and equable climate favourable for Hepaticæ. The district is mountainous, though none of the hills ascend above 3000 ft. Steep wooded ravines descend from the hills to near sea-level, and it is in these ravines that the characteristic species are most abundant. Around the shores are small cliffs and boulders, where many species are found. There is little change in the flora of the hills up to 600 ft., the height to which the ravines extend; from this to 1200 ft. there is a diminution or absence of those species requiring shade. From 1200 ft.–1800 ft. is the mid-arctic zone of Watson, with rock ledges, where the majority of the rarer alpine species are found, as with flowering plants. From 1800 ft. to the summits, 2800 ft.–2900 ft., are the more or less exposed shoulders, with few special plants.

The geological formation of the district is schistose, for the present named Dalradian, with a small quantity of granite near the shore. No limestone is found in the neighbourhood, and it is interesting to note the occurrence here in quantity of such species as *Jungermania riparia*, which appear to be confined to, or are most frequent on, that formation on the Continent.

The equability of the climate appears to be as marked as in any other part of Britain. The mean temperature for the year is about 48° F. The mean daily range from the nearest locality on the coast where it has been computed is 10·3° for the ten years 1887–96. This is from Oban, which is under conditions very similar to this district, and is only a third of a degree south of it. The mean daily range is taken from the report of the Medical Officer of Health for Oban, in his *Oban, a Health and Holiday Resort.* The rain-fall of Moidart is large, averaging from 60–70 in., varying much on the different watersheds.

The most striking features in the flora is the abundance of *Lejeuneæ* and of *Plagiochila spinulosa* forms, and the luxuriance of species in general. Several otherwise rare plants, as *Radula aquilegia*, *Mastigophora*, and *Lepidozia cupressina*, occur here in quantity. There appears to be considerable resemblance between this flora and that of Kerry, more so perhaps than with the flora of any other part of the British Isles. There are three species limited in

the British Isles, so far as known, to Moidart and the county of Kerry—*Radula Carringtonii*, *Clasmatocolea cuneifolia*, and *Scapania nimbosa*; while the comparative frequency in Kerry of several rare species, as given in Moore's *Report on Irish Hepaticæ*, has much in common with those occurring here. The apparent absence from Moidart of the two generally common species, *Porella platyphylla* and *Lophocolea heterophylla*, is noteworthy.

The number of species found in the district is 131. Three of these—*Jubula Hutchinsiæ*, *Scapania subalpina*, and *Jungermania Pearsoni*—were found in the adjoining district of Sunart, which is geographically in Argyllshire, but is included by Watson in West Inverness. The flora cannot be considered as exhausted, and there are a few critical species under examination; but those already determined form a large number of species for an area of a few square miles. The altitudes given must only be taken as the limit at which these somewhat inconspicuous plants have been observed.

The chief interest in the following list lies in the large number of species which have been examined by Mr. Pearson, to whom I am greatly indebted for much time and trouble spent with my specimens. Those which he has named for me, or has confirmed my naming at different times, have the initials W. H. P. after them. During a recent week's visit which I had the pleasure of receiving from him, the majority of the plants given below were seen *in situ*, and some new species for the district were found.

I am also indebted to Mr. McAndrew, New Galloway, for much kind help; and to Mr. McArdle, of the Royal Botanic Gardens, Glasnevin.

Plants not given in *London Catalogue of Mosses and Hepaticæ*, ed. 2, for Province 16 (West Highland), with which West Inverness is included, are marked *. Plants believed to be new to Scotland are marked †. The nomenclature, with slight exception, is that of Mr. Waddell's *Moss Exchange Club Catalogue of British Hepaticæ*.

Frullania Tamarisci (L.). Very common on trees and rocks; frequent on rocks on the hills, and ascending to 2500 ft.—**F. fragilifolia* Tayl.; W. H. P. Rather common on rocks and trees.—**F. germana* Tayl.; W. H. P. Not uncommon on shaded rocks and trees; confirmed for Scotland.—*F. dilatata* (L.). Common on trees and rocks; it does not appear to occur on the hills.

Jubula Hutchinsiæ (Hook.). Rare. Wet rocks in a ravine, Resipol, Sunart (W. H. P. & S. M. M.).

Lejeunea Mackaii (Hook.); W. H. P. On nearly perpendicular rocks in a few localities. Occurs in quantity on rocks bordering a sand-dune.—**L. ovata* Tayl.; W. H. P. Very common on rocks and trees. This species, with *L. hamatifolia*, are the commonest of the small species of the genus.—**L. hamatifolia* (Hook.); W. H. P. Very common on trees and rocks; usually creeping on other species or on mosses, but sometimes on bare rock; frequently associated with *L. ovata* and *L. patens*.—**L. serpyllifolia* (Dicks.); W. H. P. Uncommon. On wet rocks, usually in ravines.—*L. patens* Lindb.; W. H. P. Very common on wet rocks and on trees in shady places;

uncommon on the hills, but ascending to 1800 ft.—**L. ulicina* Tayl.; W. H. P. Common on other species and mosses on trees; less common on rocks. — †*L. calcarea* Lib.; W. H. P. Very rare. On a peaty bank and on a bare rock in a ravine, Roshven (c. per. April, 1899). Herr Kaalaas, in his *Beiträge zur Lebermoosflora Norwegens*, mentions this species occurring on schistose and porphyritic rocks. — *L. minutissima* (Sm.) = *L. inconspicua* (Raddi); W. H. P. Rare. On a shore rock; in quantity on some old yew trees. — †*L. microscopica* (Tayl.); W. H. P. Occurs in most of the ravines, being in quantity in some, on mosses and on other species of *Lejeunea;* also on wet shore rocks on *Radula aquilegia*. It varies considerably in size and acuteness of leaf, but is an easily recognised species.— †*L. calyptrifolia* (Hook.); W. H. P. In several localities, generally on other species on rocks in ravines; occasionally on bare rock, and in one locality on the bark of a Scotch fir.

Radula Lindbergii Gottsche; W. H. P. Roshven hill, at 2300 ft.; male plant.—**R. aquilegia* Tayl.; W. H. P. Common on wet rocks, especially at the sides of streams in ravines, more rarely on trees; frequent on wet shore rocks; fr. August, 1898. — †*R. Carringtonii* Jack.; W. H. P. Rare; on rocks in a ravine. Herr Kaalaas has found this species on the west coast of Norway.—*R. complanata* (L.); W. H. P. Very common on trees and rocks. The plant, when on wet rocks, has the leaves generally less spreading, and with much of the appearance of *R. Lindbergii;* it also less commonly fruits when on rocks.

**Porella lævigata* (Schrad.); W. H. P. Locally common at the foot of shady tree-stems and roots, usually near streams; unfrequent on rocks.

Pleurozia cochleariformis (Weiss.). Common and often abundant on wet moors to sea-level; also common on damp rock-ledges from 1200 ft.–2000 ft. as a more luxuriant and generally a lighter coloured plant.

Anthelia julacea (Lightf.). Common on wet stony places, and on rocks on the hills, ascending to the summits; not rare on the low ground to sea-level.

Herberta adunca (Dicks.). Locally common on the low ground on shady peat banks; very common on the hills on rocky banks and ledges, ascending to 1800 ft.

**Mastigophora Woodsii* (Hook.); W. H. P. Common on two hills, in one from 1200 ft.–1800 ft., in the other from 1600 tt.–1800 ft. Forms large conspicuous yellow masses on rock-ledges.

Blepharozia ciliaris Nees. Only seen in one locality among short heather on the low ground.

Trichocolea tomentella (Ehrh.). Uncommon, but found in several places, usually among wet rocks in ravines; in one locality in a bog.

**Blepharostoma trichophyllum* (Dill.); W. H. P. Common on shady banks among other species, rarely as a compact form on peaty banks; ascends to 1600 ft.

**Lepidozia cupressina* (Sw.); W. H. P. Local, but abundant on peaty banks among shore rocks, more rarely on bare rock; in one place on a stump. Forms tumid masses of some inches to a foot

in diameter.—*L. reptans* (L.). Common on peaty banks and old stumps; ascends to 1600 ft.—**L. Pearsoni* Spruce; W. H. P. In a few localities, usually on banks in shallow ravines among *Sphagnum* with *Bazzania tricrenata* and *Jungermania orcadensis*.—**L. setacea* (Web.); W. H. P. Very common on peaty banks, tree-roots, and on moors.

Bazzania trilobata (L.). Frequent on shady rocky banks.—*B. tricrenata* (Wahlenb.); W. H. P. Very common and variable; on shady banks, rocky ledges, sometimes on mossy tree-stems, and occasionally on bare rock. Equally common on the hills to 1800 ft., and ascending to 2500 ft. A small form occurs on rocks in ravines with the leaf apex frequently entire, and the stipules entire or emarginate.

**Kantia trichomanis* (L.). Common on banks on loamy soil.—†*K. arguta* (Mart.); W. H. P. In several localities on bare soil on damp banks.

Cephalozia catenulata (Hüben.); W. H. P. On stumps in several places.—**C. lunulæfolia* Dum.; W. H. P. Common on peaty banks.—*C. bicuspidata* (L.); W. H. P. Very common on banks, moors, and stumps; noted to 1800 ft.—**C. Lammersiana* (Hüben.); W. H. P. In marshy places; perhaps not rare.—*C. connivens* (Dicks.); W. H. P. Among *Sphagnum* in marshy places; only gathered in three localities, but probably not rare.—*C. curvifolia* (Dicks.). Locally plentiful on logs in shady places; also on bare peat on some moors.—**C. fluitans* (Nees); W. H. P. Rare; in wet bogs.—*C. Sphagni* (Dicks.). Very common on wet moors.—*C. denudata* (Mart.). On a stump near a waterfall.—*C. divaricata* (Sm.); W. H. P. Common on bare peaty soil; occurs also on loamy and rocky banks, occasionally creeping over *Frullania*.

†*Adelanthus decipiens* (Hook.); W. H. P. Frequent on rocks in many localities, in patches of several inches, or mixed with other species, as *Plagiochila spinulosa*, small forms of which it resembles in habit. When growing alone *Adelanthus* usually forms more compact tufts than that species, and is readily recognized from it by the anterior margin of the leaf being inflexed.

Hygrobiella laxifolia* (Hook.); W. H. P. Rather common in slits of rock at the side of streams, frequently with *Jungermania pumila*; wet stony places; on a peaty footpath with *Cephalozia bicuspidata* and *Marsupella Funckii*: fr. May, 1899.—H. myriocarpa* (Carr.); W. H. P. Mixed with the preceding at the sides of streams. Only observed in two localities, but probably frequently among the other.

Scapania compacta* (Lindeb.); W. H. P. Frequent on rocks and boulders.—S. resupinata* (Dill.; L.). Very common on banks, rocks, and trees on the low ground, often forming patches of a foot or more across; frequent on rock-ledges on the hills, usually mixed with other species, and not forming large patches.—**S. subalpina* (Nees); W. H. P. Rare; side of stream among gravelly detritus, in which the stems are partly buried. Resipol, Sunart (W. H. P. & S. M. M.).—†*S. nimbosa* (Tayl.); W. H. P. Very rare. On a rock-ledge, and on a rocky bank at 1700 ft., associated with *S. planifolia*,

Mastigophora, *Bazzania tricrenata*, *Jamesoniella Carringtonii*, *Herberta adunca*, *Diplophyllum albicans*, and in one locality with *Breutelia arcuata*. Liable to be overlooked when growing with *S. planifolia*, but is distinguished from it by being rather more slender, more erect, and not in layers as that species usually is; lower lobe smaller, recurved, while in *S. planifolia* it is flat and spreading, giving this latter plant a compressed appearance. Under the lens the long irregularly spinous cilia at once distinguish it, for, although the cilia vary in size in *S. planifolia* on different stems, they are always regular and straight, never curved as they frequently are in *S. nimbosa*. The upper lobe is concave from the sides being inflexed, with the point incurved; it is not adpressed to the stem, nor should I consider the lower lobe so much deflexed as to give the shoots a squarrose appearance, as has been described. This extremely rare species has only been found elsewhere very sparingly in the South of Ireland. I was pleased to be able to show it to Mr. Pearson in its Moidart locality.—*S. æquiloba* (Schwaeger.); W. H. P. On rocks in several localities; very luxuriant on grassy sand-banks among rocks on the shore.—†*S. aspera* Müll. & Bern.; W. H. P. Rare; on a sand-dune. An interesting instance of a limestone species occurring among the shell-sand of shores. I also found this plant in the limestone island of Lismore, Argyll, in 1898.—**S. nemorosa* (L.). Uncommon; on wet banks.—**S. ornithopodioides* (With.)=*S. planifolia* (Hook.); W. H. P. On rock-ledges in several places on the hills from 1200 ft.–1800 ft., frequently associated with *Mastigophora*. This species has been found in Western Norway by Herr Kaalaas.— *S. undulata* (L.); W. H. P. Very common on wet rocks and stones, especially in streams, and on wet stony places and springs from sea-level to near the summits of the hills.—**S. purpurea* (Dill.), Carr.; W. H. P. Common on rocks in streams, and in wet places about the shores.—**S. irrigua* (Nees); W. H. P. Rare. Only seen in one locality on wet grassy ground.—*S. uliginosa* (Sw.); W. H. P. Rare. In a few wet places on the hills.— **S. rosacea* (Corda); W. H. P. Rare; on rocky ledges from 1200 ft.–1800 ft.— *S. curta* (Mart.); W. H. P. Very little seen; on bare moist banks.—**S. convexa* (Scop.); W. H. P. Common on partly buried rocks, and on stumps in ravines and shady woods. This pretty species is very fine in this district.

Diplophyllum albicans (L.). Very common from sea-level to the summits of the hills.—**D. taxifolium* (Wahlenb.); W. H. P. Rare; on the hills from 1700 ft. to the summits. This is by no means a depauperate form of the preceding species, as I have seen stated. It is not especially found on poor or exposed ground, but more commonly on rock-ledges with other species growing luxuriantly. The depauperate state of *albicans* on dry exposed places, especially on the summits of the hills, has the median line of cells easily observed in the young green leaves.— **D. obtusifolium* (Hook.); W. H. P. Rare; on a loamy bank in a wood (W. H. P. & S. M. M.).—**D. ovatum* (Dicks.); W. H. P. Rather common on rocks and boulders on the hills, but is found to sea-level. In one locality on a tree.

Lophocolea bidentata (L.). Common on wet grassy and rocky banks, and among wet rocks on the shore ; uncommon on the hills, but ascending to 1700 ft.—†*L. spicata* Tayl. ; W. H. P. Frequent among wet shore rocks ; c. per. November, 1898.

†*Clasmatocolea cuneifolia* (Hook.), Spruce ; W. H. P. On birch trees in two localities growing on the bark and on *Frullania:* on a rock in a ravine creeping among *Radula aquilegia* with *Lejeunea ovata*, *L. microscopica*, *Plagiochila punctata*, and *P. tridenticulata*. On the trees it grows in reddish brown patches of a few inches, or creeping over the *Frullania*. Although a small plant, it is not difficult to recognise when growing in patches, there being nothing with its appearance in this district except a small lichen which grows in similar places, and has much the same colour. Single stems creeping among *Frullania* can hardly be seen with the naked eye. Besides the South of Ireland, this plant has been found in Stavanger, Norway, by Herr Kaalaas, who writes me that the Moidart specimens are much more luxuriant than his, or those which he has from Ireland.

**Chiloscyphus polyanthos* (L.) ; W. H. P. Common among rocks and stones by the side of streams and lochs, and in wet grassy places and springs.

**Harpanthus scutatus* (Web. & Mohr) ; W. H. P. Frequent ; on rocks among *Scapania convexa*, on peat-banks with *Lepidozia setacea ;* in patches by itself on wet shore rocks ; fr. May.

**Mylia Taylori* (Hook.) ; W. H. P. Very common on banks on the moors and in woods ; not unfrequent in shallower patches on wet rocks in ravines ; ascends to 1800 ft. When growing on dry peaty banks this species has frequently prostrate creeping stems.—*M. anomala* (Hook.). Common on wet moors.

Plagiochila asplenioides (L.). Common on moist banks in woods. The large form (*major* Carr.) is not unfrequent.—*Var. *minor* Carr. & Pears. ; W. H. P. On the sandy shore of a loch.—*Var. *Dillenii* Tayl. ; W. H. P. Very common on rocks near streams in ravines. —**P. spinulosa* (Dicks.) ; W. H. P. Very common and variable on rocks and banks in woods ; ascends to 1700 ft. at least. — *P. punctata* (Tayl.) ; W. H. P. Common and very variable on tree-stems and rocky banks ; ascends to 2500 ft.—**P. tridenticulata* (Tayl.) ; W. H. P. Frequent on rocks in ravines, occasionally on trees. Occurs in considerable patches alone, or as scattered stems among other species. In the former case it may be recognised at sight from the two preceding species by its indigo-green colour.

**Jamesoniella Carringtonii* (Balf.) ; W. H. P. Frequent on the hills from 1200 ft.–1800 ft., descending to 1000 ft. When on rock-ledges it occurs as scattered stems among other species ; on grassy banks it forms somewhat compact tufts by itself, or associated with *Bazzania tricrenata* and *Jungermania orcadensis*.

Jungermania pumila (With.) ; W. H. P. Very common on rocks by the side of streams ; frequent on wet banks.—**J. riparia* Tayl. ; W. H. P. Common among wet rocks and sides of streams ; ascends to 1700 ft.—*J. inflata* Huds. Uncommon, but occurs in large patches among wet rocks on the moors and on the shores ; also as

scattered stems in peat mosses.—**J. exsecta* Schmid.; W. H. P Rather common. On peaty banks with *Lepidozia setacea;* on stumps with *Scapania convexa;* frequently as single stems among othe species; in quantity on a sandy bank.—**J. lycopodioides* Tayl.; W. H. P. Very rare. Roshven hill at 2500 ft. in a tuft of *Saxifraga hypnoides.*—*J. barbata* Schmid. Common at the foot of some shady walls; rarely on rocks.—**J. Lyoni* Tayl. Common on banks, trees, &c.; ascends to 2500 ft. This is one of the most frequent species. The male plant has the two anterior teeth of the leaves inflexed, giving it somewhat the appearance of *J. Floerkii.* —*J. gracilis* Schleich.; W. H. P. On old stumps and on rocks. —**J. incisa* Schrad.; W. H. P. Not uncommon on peaty banks in woods and on moors; ascends to 1700 ft. on rocky banks.— **J. bicrenata* Schmid.; W. H. P. Rare; on bare peaty banks with *Scapania curta.*—**J. alpestris* Schleich.; W. H. P. Rare; on exposed ground on the hills from 1600 ft. to the summits.—*J. porphyroleuca* Nees; W. H. P. On bare peat in a wood; untypical (W. H. P. & S. M. M.).—**J. ventricosa* Dicks. Common on banks, tree roots, &c.; rather common on the hills to 1700 ft.—**J. orcadensis* Hook.; W. H. P. Very common on grassy banks on the hills; uncommon on the low ground, but descends to sea-level. Nearly always associated with *Bazzania tricrenata,* which it resembles in habit.—†*J. obtusa* Lindb.; W. H. P. Very rare. Rocky ledge with *J. orcadensis,* Ben Gaire, north side, alt. 1700 ft., July 27th, 1898. New to the British Isles. This species has otherwise only been found in Sweden, Switzerland, and Styria. A short diagnosis of the plant is given in Lindberg's *Musci Scandinavici.* A description, with plate, will be given in Mr. Pearson's *Hepaticæ of the British Isles,* at present preparing for publication. The identification of the species as British is due to Mr. Pearson, the plant being unknown to me.—**J. bantriensis* Hook.; W. H. P. Rare; on a wet bank in a ravine (W. H. P. & S. M. M.).—*Var. *Müllerí* Nees; W. H. P. Not uncommon on wet rocks in ravines.—**J. minuta* Crantz; W. H. P. Common among rocks in peaty soil; rare on the hills, where it was observed at 1800 ft.—**J. Pearsoni* Spruce; W. H. P. Very rare. On a travelled granite boulder in a ravine, Resipol, Sunart (W. H. P. & S. M. M.). The only other recorded locality for the species in Scotland is, I think, New Galloway, where it was discovered a few years ago by Mr. McAndrew.— *J. crenulata* Sm. Local; on loamy footpaths.—*J. gracillima* Sm. Frequent on loamy and shale banks; sometimes with the preceding, but frequently by itself.

Eucalyx hyalina (Lyell). Not uncommon on damp loamy banks, and at the sides of ravines.—**E. obovata* (Nees); W. H. P. Common on wet rocks, especially at the sides of streams; ascends to 2500 ft.

Nardia compressa (Hook.); W. H. P. Only seen in one locality in a stream at 600 ft.—*N. scalaris* (Schrad.); W. H. P. Very common on bare soil and among rocks to the summits of the hills; also common at the side of streams, where it is occasionally submerged.

Marsupella emarginata Ehrh.; W. H. P. Very common on wet rocks, stones, and in springs; occasionally on drier boulders. Ascends to the uppermost springs on the hills.—*M. Funckii* (Web. & Mohr); W. H. P. Very common on soil at the side of rocky footpaths. — *M. Stableri* Spruce; W. H. P. On boulders at about 1400 ft. (W. H. P. & S. M. M.). This species was found on Ben Mac Dhui by Mr. Stabler in 1884, and I understand that Dr. Carrington found it at Glenfinnan, near Moidart.—†*M. ustulata* Spruce; W. H. P. On granite in one locality (W. H. P. & S. M. M.).

Acolea obtusa Lindb.; W. H. P. Rare on the low ground, but descends to sea-level; common on the hills from 1200 ft.–2000 ft. —*A. concinnata* (Corda); W. H. P. Not seen below 1400 ft.; frequent from this to the summits.—*A. crenulata* Gottsche; W. H. P. Frequent on rocks and boulders on the hills, rarely below 1200 ft.; noted from 700 ft.–2500 ft., and in one locality at sea-level.

**Saccogyna viticulosa* (Mich.). Very common on wet banks.

**Fossombronia pusilla* (L.). On a ditch-bank with *Anthoceros punctatus*; fr. October. — **F. cristata* Lindb.; W. H. P. On a damp footpath; fr. October.

**Scalia Hookeri* (Lyell); W. H. P. Probably rare, though readily overlooked. In a shallow marsh near the shore with *Aneura pinguis* and *Hypnum revolvens*. Grows in small erect green tufts unlike any other species of *Hepaticæ*. It might be overlooked for small *Bryum bimum*, or the young green points of a *Sphagnum*. It bears a striking superficial resemblance to young plants of *Selaginella*. Mr. Pearson also gathered it in another part of the marsh in its Moidart locality, which seems to be the only place in Britain where it is at present known.

**Blasia pusilla* (L.); W. H. P. Rare; on a wet rock by the side of a stream; in a marsh among rocks.

Pellia epiphylla (L.). Very common on bare soil on wet banks, and at sides of streams; ascends to 2500 ft.—*P. calycina* (Tayl.); W. H. P. Common in wet places among rocks.

Aneura palmata (Hedw.). Not uncommon on old logs in rather wet shady places.—*A. multifida* *var. *ambrosioides* Nees; W. H. P. Common on wet rocky banks, especially in ravines. A plant frequent in marshes may be the type.—*A. latifrons* Lindb.; W. H. P. Common as a compact form on bare peat in shady places; also common as a larger more diffuse plant among wet rocks, especially sea-cliffs; ascends to 1400 ft.—**A. pinguis* (L.); W. H. P. Common in wet places, ascending to 1800 ft. at least. On the hills the plant with narrow fronds creeping over moss-tufts is the most frequent form.

**Metzgeria hamata* Lindb.; W. H. P. Common on wet rocks in some ravines, forming luxuriant patches of two to three feet across; rare on the hills, but ascending to 1700 ft.—*M. furcata* (L.). Very common on shady trees; common on rocks in shade, and in some exposed localities. — **M. conjugata* Lindb.; W. H. P. Rather common on rocks and trees in ravines.

Marchantia polymorpha L. Uncommon. In garden-beds; in a marsh among rushes; at the foot of a damp wall.

Conocephalus conicus L. Very common on wet soil among rocks on the low ground; uncommon on the hills, where it ascends to 1800 ft.

Reboulia hemisphærica (L.). Rather common on exposed rocky banks.

**Chomiocarpon quadratus* (Scop.). Rather common among wet shady rocks; also occurs in stony marshy places.

**Lunularia cruciata* (L.); W. H. P. In flower-pots in a greenhouse.

**Riccia glauca* L.; W. H. P. Locally common in autumn in garden-beds and potato-fields.

**Anthoceros punctatus* L. Rare; at the side of a ditch; fr. October.

In addition to the above, the following species have been recorded from West Inverness. Some others, including those given in the *London Catalogue* for Province 16 not mentioned in my list, may have been from this vice-county; but I have not immediate access to the records:—

Anthelia Juratzkana Limpr. "On moist rocks below the summit of Ben Nevis; in fruit August, 1880 (W. West!)." Spruce, *On Cephalozia*.

Pleuroclada (*Jungermania*) *albescens* (Hook.). "Summit of Ben Nevis on the ground." Hooker's *Flora Scotica*, 1821.

Marsupella conferta (Limpr.), Spruce. "Ben Nevis, at about 4000 ft., Mr. W. West, 12th August, 1880." W. H. Pearson in *Journ. Bot.* 1892, p. 257.

Marsupella (*Hygrobiella*) *nevicensis* (Carr.). "Ben Nevis, on moist shelving rocks (J. Whitehead!, July, 1875)." Spruce, *On Cephalozia*.

Acolea (*Gymnomitrium*) *corallioides* Nees. "Found among duplicates of the latter [*A. concinnata*] in Dr. Greville's herbarium; collected on Ben Nevis . . . 1830!" Carrington's *British Hepaticæ*.

ON THE PROBABLE STATUS OF SOME IRISH PLANTS.

By the Rev. E. S. Marshall, M.A., F.L.S.

My friends Messrs. Colgan and Scully, in their reply (pp. 315–317) to my remarks, have shown good temper, dignity and moderation. As the business of a critic is to criticize, I feel that I have nothing to reproach myself with in what I wrote; the very excellence and conscientiousness of their work, which will remain the standard book on Irish plants until they are called upon to produce a fresh edition, makes it the more desirable that points open to any serious question should be discussed.

In the current number of the *Irish Naturalist* (p. 160) it is said: "We fancy that the severe treatment of some of these in *Cybele* was hardly warranted by the facts"; so that my contention receives support from others who have an intimate acquaintance with the flora of the Emerald Isle.

I cannot admit that there is any error in using "wild" as synonymous with "native"; "wild flowers," "wild thyme," "wild boar," "wild cat" do not imply plants or animals introduced directly or indirectly by man. Although the word has to do duty for a host of meanings, I submit that its primary significance is the opposite of "tame"; and that it is our only English equivalent for foreign adjectives like "native," "indigenous," "autochthonous," &c. As regards *Sedum dasyphyllum*, I must again distinctly join issue. Messrs. Allin and Phillips probably had the fear of the former editors before their eyes; but methinks it is clear that both of them believe this plant to be a probable native in the Carrickshean station. It is not indigenous in England; but I do not know any instance of an introduced stonecrop spreading over and covering a range of hills. Anyhow, to star it as "certainly introduced" is quite arbitrary.

The editors very justly say that "each of us has his more or less of unconscious mental bias"; but it is surely everyone's duty to discover and correct that bias. I have sometimes failed to do this; *e. g.* I now believe that Mr. Beeby was right in considering *Festuca heterophylla* Lam. as probably introduced at Witley, Surrey (it may have been brought there by Mr. Philip Barker Webb, a botanist of European reputation, who was (up to his death in 1854) the squire of my present parish, and was related to the owner of Witley Manor). However, having occasion recently to assess the standing of all the plants found in Kent, a county which outnumbers Ireland in its native or naturalized flora, I was obliged to balance probabilities carefully; with what amount of success others must judge. Mr. H. C. Watson, Mr. A. G. More, and the present editors, in their revolt against the uncritical methods formerly prevalent, appear to me to have let their "unconscious bias" to some extent carry them away. The great aim of botany, as of all sciences, must be to arrive at absolute truth, or as near an approach to that as difficulties and uncertainties permit; it is no less an offence against accuracy to rashly rule a plant "out of court" than to rashly admit it as a true native.

My friends express the hope that I may be converted to their scepticism. If they mean "universal doubt" (the definition of scepticism in Nuttall's *Dictionary*), I cannot endorse the wish. But it seems to me that the genuine σκεπτικός is the man who looks at the subject under consideration "all round," ignoring no direct or indirect evidence within his reach. This I have tried to do in the extreme case of *Sisyrinchium californicum*, which no one would have expected to occur naturally in Europe—paying a second visit to its station for the express purpose of closely examining the conditions and surroundings afresh. It is quite possible, though hardly probable, that some amiable lunatic may have planted or sown it at Rosslare, many years since; but I consider its accidental introduction very unlikely indeed, and a glance at the Ordnance map might have saved the editors from some irrelevant guessing: still, I cannot in the least complain of its being marked with a sign of great suspicion.

The case of the summer snowflake is different; here we have a native of Western Europe, admitted by good judges to be indigenous

in several southern English counties, yet relegated to the "excluded species," on the ground of its being a "cultivated ornamental plant." I would ask, *is* it commonly grown in gardens? *Leucojum vernum* and one or two other species are not unfrequently to be seen; but I do not remember to have noticed this particular plant, with its coarser, stiff-growing herbage, except where it had been purposely brought in from "wild" stations.

As regards *Iris fœtidissima*, Mr. Lloyd Praeger writes to me that he agrees with the editors; nevertheless, I still suggest that it may be native in a few of its Irish habitats, basing this presumption upon its frequency on the south coasts of England, as well as its continental distribution. (I happen never to have gathered this north of the Thames, and in one or two of the localities known to me it may be only a relic of cultivation.)

Respecting the supposed extinction of *Euphorbia Peplis*, the fact that I paid two fruitless visits to Shalford in search of *Cyperus fuscus*, and found it abundant on the third and fourth occasions over ground where in other seasons not a specimen was to be seen, appears to justify my hope that Tramore may still produce this rare little spurge.

Ireland is still a very long way from being thoroughly explored, botanically; doubtless, as time goes on, several species now known to occur in only one or two places will prove to be more frequent, and some additions will be made. The presence of an American group of undoubtedly native Irish plants (*Spiranthes Romanzoffiana*, *Eriocaulon septangulare*, *Naias flexilis* and *Hieracium auratum*) gives good ground for believing that *Sisyrinchium angustifolium* and *Juncus tenuis* are equally native; the latter is not likely to have been imported into Co. Kerry with American hay, and the former is widely distributed, several of its habitats being quite off the beaten track.

In conclusion, let me apologize for the length of this paper, and assure my friends that nothing has been further from my intention than a personal attack on them.

SHORT NOTES.

Alopecurus pronus Mitten. — Last winter Dr. Ascherson asked me for some information respecting the above-named grass, and it may be well to put on record the result of the inquiry I made. The name appears in Hooker and Arnott's *British Flora*, ed. 8, p. 530 (1860); the plant was gathered at Albourne Place, near Hurstpierpoint, Sussex, July, 1854. Syme (Eng. Bot. ed. 3, vol. xi. p. 26 (1872)) has the following note:—"*A. pronus* I have always understood to be a form of *A. geniculatus*, with the stems not geniculate. Dr. Hooker, however, in the *Student's Flora*, says it is a 'prostrate form' of *A. pratensis*. As I have not seen the plant, I am unable to offer any opinion. The Rev. W. W. Newbould informs me that from a casual examination of the specimens, named *A. pronus* in

Mr. Borrer's Herbarium at Kew, he is inclined to think that there is either a mixture of specimens of *A. geniculatus* and *A. pratensis*, or that they are hybrids. If the latter be the case, probably *A. pronus* is the same as *A. pratensis-geniculatus* Wichura (*A. hybridus* Wimmer), mentioned in Garcke's *Flora von Nord- und Mittel-Deutschland* (ed. vi. p. 438), of which I have specimens from Bremen, collected by Dr. Focke." The following extract from a letter from Mr. Mitten will enable the plant to be struck out of our lists:—"I am glad you asked me about *Alopecurus pronus*, of which I cannot find that I have now any specimen remaining. When I gathered it the appearance as to the flowers was so different from *A. geniculatus* that I was imposed upon by its altered state, which some time after I found was due to a minute insect which had infested the flowers, and caused distortion in their form." Mr. Mitten also mentions having found *Empetrum nigrum* "on one of the sandy marshes by Poole Harbour, a large plant to all appearance from one original root, two yards in diameter: we used to have this at Amberley."—Arthur Bennett.

Epipactis atrorubens Schultes (p. 328).—It must be remembered with regard to Fries's *E. media* that *E. microphylla* Sw. was supposed for many years to be a Scandinavian species, and it is duly recorded as such as lately as 1879 by Hartman (Handb. Skand. Fl. 395). Fries (Summa Veg. Scand. 218) remarks: "*E. media* (Fr. Mant. ii. 54) est quidem *E. rubiginosa* Koch, sed colore florum variat albus, roseus, &c." He goes on to say: "*S. latifoliæ* varr. *viridiflora* et *atrorubens* Hoffm. æque jure in formis *E. latifoliæ* quæras." I have a Settle specimen whose leaves would almost fit Fries's remark quoted by Mr. Marshall. In the new edition of Hartman (1889) Almquist places all the forms of *E. latifolia* under *E. Helleborine*.—Arthur Bennett.

Selinum Carvifolia L. (pp. 244, 326). — I was glad to see Dr. F. A. Lees's note on this species; but I think I may say I know how to distinguish a raised bank from a general "rise of the ground," or a sinking from the drainage becoming more complete year by year. Perhaps I do not understand "the changes in our Flora"; nevertheless I still adhere to my opinion that the *Selinum* where I saw it is not indigenous to Cambridgeshire. My friend Mr. Fryer, who is far more able to judge than I am, was of the same opinion when we discussed it on the spot. I suppose one may conclude from Dr. Lees's remarks that he considers it native (*i. e.* indigenous) in Lincoln; this I cannot dispute, not having seen it in that county, though, if I may express an opinion founded on Dr. Lees's own remarks when recording the species there, I should doubt it. Dr. Lees may reasonably say I should not have used the word "wild" in conjunction with naturalized; it would have been better to have said "and looking wild," which, of course, if naturalized, it does.—Arthur Bennett.

Thesium humifusum DC. in E. Kent.—The Rev. Ernest Ellman informs me that he found this plant (with which he is quite well acquainted, in Sussex) near Bishopsbourne (Dist. 7) some years

ago; its apparent absence from the county is noticed in *Flora of Kent* as being remarkable. I would suggest that the chalk downs between Burham and Boxley are very likely to furnish another habitat.—Edward S. Marshall.

Arenaria balearica (p. 328).—This note refers to some specimens that I threw on some rocks in my ground. I am very fond of the plant for the garden, and as it runs everywhere over stones (without earth), I thought I would give it a trial on these dry rocks.—William Robinson.

Hypnum Wilsoni in Lincolnshire.—Amongst a parcel of other mosses collected by the Rev. W. W. Mason on June 9th, 1899, at N. Somercotes, Lincolnshire, and brought to me for identification, I found fine specimens of *Hypnum Wilsoni* Schimp., which, so far as I am aware, has not previously been recorded for this county.—J. A. Wheldon.

A Hybrid Orchid.—On June 23rd, 1898, on the slope of the chalk escarpment north of Sevenoaks, I observed, growing in company with *Orchis maculata* and *Gymnadenia conopsea*, two flowering spikes of intermediate appearance, resembling the former in general aspect, and the latter in colour. Further examination showed that they resembled *O. maculata* in the stout spur without free honey, the spotted lip, and the absence of strong aromatic fragrance. In the leading generic character the flowers resembled *Gymnadenia* rather than *Orchis*, the viscid glands being twice as long as broad, destitute of a pouch, and so placed as to form the roof of the entrance to the nectary, the stigmatic surfaces being thus necessarily lateral. The spur, while as stout as that of *O. maculata*, differed from it in being slightly curved, and rather longer than the germen. Even in minor details, such as the texture of the pollen-masses and the nearly horizontal lateral sepals with strongly revolute margins, the affinity to *G. conopsea* was shown, as also in the fact that these sepals usually expanded *before* the lip. This year I again found in the same place two spikes of the intermediate plant, and, having submitted one of these in a fresh state to Mr. Frederick J. Hanbury, he agrees with me that the plant must be a hybrid. According to Darwin and Müller, *O. maculata* is fertilized by diptera, and *G. conopsea* by night-flying moths, but the occurrence of the hybrid shows that the same insect occasionally visits both. From evidence incidentally furnished in Pryor's *Flora of Hertfordshire*, I believe that the plant known as *Orchis latifolia* var. *angustifolia* usually grows associated with *G. conopsea*, and I would recommend botanists who have observed this form to ascertain whether it be not, as I think probable, the hybrid in question.—Henry Peirson.

Cheshire Plants.—Two curious and of course accidental omissions have been made from the *Flora of Cheshire:* of *Arenaria trinervia* and *Myosotis cæspitosa*. I noted both species during a visit to Hoylake in 1893. The Liverpool floras give both as common. In a ditch, then dry, I gathered one specimen of *M. cæspitosa* of remarkable luxuriance. It measured twelve inches from the base

of the stem to the lowest flowers, and (exclusive of some small side branches) bore thirty-eight ultimate flowering branches of from nine to fifteen inches long, with blossoms (past and present) numbering from fifteen to twenty-five on each. Close by were also found several plants of about normal character, save that they partook somewhat of the length and slenderness of branches which marked the foregoing, with flowers all of pure white—singularly beautiful.—William Whitwell.

Form of Asplenium Ruta-muraria. — A unique specimen of a fern was collected and sent to me by Dr. St. Brody in August, 1896. It was gathered on an old wall, in a shady damp peaty spot on the Dartmoor Hills, five or six miles from the Plympton railway station, South Devon. The identification is perhaps open to doubt, but the opinion of most botanists who have seen the specimen is in favour of its being a singular form of *Asplenium Ruta-muraria* L. It consists of a single frond. Two smaller ones, somewhat similar, were obtained at the same time, but they were so imperfect that Dr. St. Brody took no special care of them, and cannot now trace them. The frond is six inches long, the stipes and the rachis being each three inches. Its chief peculiarity is in the length and narrowness of the lamina, and its evenness of width, the length being three inches, and the width half an inch throughout. The pinnæ are somewhat closely set, rather expanded and flabellate, partially subdivided, and placed on rather short stalks on alternate sides of the rachis. The contour of the whole is thus entirely different from that of the ordinary forms of *Ruta-muraria*. The specimen was exhibited at the Linnean Society on June 15, and is now in the National Herbarium at South Kensington.—William Whitwell.

Sagina apetala in Westerness? — There is some doubt as to the correct naming of the plant recorded for Westerness (v.-c. 97) on p. 345 of this Journal for 1895; and, until another specimen is found, it will be safest to add a mark of interrogation to the record. —W. F. Miller.

Kentish Plants.—Recently I met with a small patch of *Arenaria tenuifolia* on a chalk hill near Eynsford. The nearest station before recorded is, I see, Dartford, in the same district. *Isatis tinctoria* occurs on Morants Court Hill, near Dunton Green, a locality not recorded in the Kentish Flora, although lying midway between two recorded localities at Wrotham and West Wickham. *Claytonia perfoliata* Donn appears to have established itself in Bradbourne Park Road, Sevenoaks, amongst the gravel by the footpath. *Sambucus Ebulus* I have seen for many years inside the hedge of a field at Otford, in District 8, but not near any ruin nor even near houses except on the opposite side of the road, where it does not grow. *Brassica oleracea* has established itself on the rocky sides of a cutting in the chalk near Halstead Station, in District 1.—E. M. Holmes.

NOTICES OF BOOKS.

A Text-book of Plant Diseases. By George Massee, F.L.S., Principal Assistant (Cryptogams), Royal Herbarium, Kew. Duckworth & Co. 8vo, pp. xii, 458. 5*s*.

This is a book specially intended for the owners of fields, orchards, and gardens; it describes and illustrates with a series of new illustrations a very large number of plant diseases of vegetable origin—not only such diseases as are commonly found in this country, but several that are met with abroad, both in temperate and tropical countries. It gives under each disease preventive methods; this latter portion should be found of high value to horticulturists, foresters, and farmers, as nothing so complete has hitherto been published in this country. In addition, a certain number of references are given to sources whence fuller particulars may be obtained if desired.

The illustrations, nearly a hundred in number, appear to be practically new, and though produced by a "half-tint process" are all remarkably well done.

The work begins with an Introduction, which briefly describes the nature and mode of growth of fungi, with well selected and illustrated types, the general modes of prevention or cure, and a series of excellent hints or instructions to be daily observed in every well-kept garden, orchard, plantation, or farm. "Fungicides" and methods of spraying are very fully dealt with.

The body of the work consists of descriptions, illustrations to scale, and remedies against plant diseases, British and foreign. English names are given first, such as "damping off," "Lima bean mildew," "maize mildew," &c., followed by the latest scientific names. The potato disease, *Phytophthora*, is followed at once by other species of the same genus, and then numerous species of *Peronospora*, some of which here figure as *Plasmophora* and *Bremia*. The genus *Exoascus* Fkl. then follows,—there appears to be no excuse for giving Fückel's name, dating only from 1861, as Montagne and Desmazières founded the genus *Ascomyces* for the reception of these plants in the *Annales des Sc. Nat.* 3, x. p. 344, in 1848. De Bary adopted Fückel's name in *Beiträge* i. p. 33, and so helped to fix an erroneous new name. The so-called *Exoascus* and members of the genus named *Exobasidium* we have sometimes observed to grow in close company on the same host, as if indeed both were conditions of one parasite. In the pages following *Exoascus* nearly every plant disease one has heard of is briefly described, and in many instances clearly and well illustrated. Further on in the volume, the woody fungi of trees and timber are described, with the newest names, such as *Poria*, *Fomes*, &c., which one usually finds described under *Polyporus*.

At page 349 there is a sudden break, and a paragraph in the middle of a page abruptly begins "Fungi—Phycomycetes." Surely a new page should have commenced here, headed "Scientific Descriptions of the Fungi enumerated as causing Diseases" as given

in contents on p. ix. These later descriptions are not arranged in families and orders, but one genus follows another on no very evident plan. The index, however, serves to show where these genera,—if a generic name happens to be known,—are to be found. Although a very large number of fungi are described in this book, some species well known to gardeners find no place, such as those most destructive to orchids, as *Trichobasis Lynchii*, *Vilmadoche curvipes*, *Cladosporium orchidearum*, and several others. Orchids, indeed, do not occur in the list of host plants, although *Nectria vandæ* is described. Gardeners will no doubt expect to find Palm, Vinca, Primula, Campanula, Thuja, Cupressus, Geranium, &c., indexed under host-plants of diseases, but we have failed to see them. We have, however, no desire to find any fault with what is obviously an excellent book, compiled and illustrated with great labour and care. Additions may be made to a second edition. As it is, this *Text-book of Plant Diseases* is eminently one to be kept as a volume for constant reference and everyday use. No garden establishment should be without a copy, as information about any ordinary plant disease is almost certain to be found within its covers.

W. G. S.

De Genere Malpighia. By Prof. F. Niedenzu. Brunsberg, 1899. 4to, pp. 19.*

Prof. Niedenzu has followed up his monograph of *Bunchosia* by the present work on *Malpighia*. M. Adrien de Jussieu, fifty years ago, when he monographed *Malpighiaceæ* had twenty species; Prof. Niedenzu carefully characterizes twenty-four; but the seemingly small numerical increase may be accounted for by the fact that a certain number of plants considered by the earlier botanists as worthy of specific rank are now relegated to a subordinate grade, and placed either as varieties or forms. Prof. Niedenzu makes two subgenera, which he names *Homoiostylis* and *Didymostylis*, the main character in the former being that the styles are subequal or only slightly unequal, while in the latter the two posterior styles are manifestly longer and thicker than the anterior.

The sections in the first subgenus are *Ptilothrix* and *Paliurothrix*, the former including *M. mexicana* Juss. and *M. tomentosa* Pav.; the latter, *M. glabra* L., *M. Semeruco* Juss., *M. Galeottiana* Juss., and *M. heterophylla* Griseb. The sections in the subgenus *Didymostylis* are *Homoiostema* and *Digigantostema*, based, as the names imply, on the subequality or disparity in structure of the stamens.

We congratulate the author on the careful and painstaking manner in which he has performed his work from the material at his command; but we can hardly consider this as a final treatment of the genus. As we said when noticing his monograph of *Bunchosia*,† if he had been able to visit this country he would have

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* Prefixed to *Index Lectionum in Lyceo Regio Hosiano Brunsbergensi*, per æstatem, a die xv Aprilis, anni MDCCCIC instituendarum.

† Journ. Bot. 1898, p. 356.

made his work much more complete. For example: among the plants published by Philip Miller, in the eighth edition of his Dictionary (1768), are *Malpighia nitida* and *M. incana*. Of the former, which has been somewhat misunderstood by more than one author, there are good specimens in the Banksian Herbarium. Miller's diagnostic phrase is "foliis ovatis acutis glabris pedunculis umbellatis alaribus terminalibusque." Jussieu, in Walpers Rep. v. p. 153, under *M. lucida* Pavon, says "An eadem cum *M. nitida* Mill. (non L.) an utraque potius cum *M. glabra β acuminata* confundenda?" Mr. Hemsley (*Bot. Biol. Centrali Americana*, i. p. 147) places it as a synonym of *β acuminata*. Prof. Niedenzu treats it as a synonym of *M. glabra* L. var. *lancifolia* Nied., which he diagnoses as having "foliis lanceolatis usque 6 cm. longis et 2 cm. latis"; but Miller distinctly states the leaves are ovate, which we find borne out by his specimens, the measurements being 4–5 cm. long by ± 3 broad; they are also, as Miller states, acute, and not acuminate. Prof. Niedenzu does not quote the original locality given by Miller for his *M. incana* (*i. e.*, Campeachy), but identifies it with Wright, no. 1583, from Cuba; and he also states he has seen typical material from Mexico. Whether he has correctly interpreted this plant seems doubtful. His description agrees with the type, except in one or two minor particulars; but we have not had an opportunity of comparing the Cuban plant with it.

Prof. Niedenzu ought, we think, in some form or other, to deal with the plants which have been described in the genus which he is monographing, although in his preface he states: "Alia specimina mihi aut etsi promissa non sunt missa aut ne promissa quidem, quamvis iterum iterumque oraverim, 'ut etiam cetera ac si fieri potest omnia exsiccata mihi tradantur ut discrimina sat difficilia penitus cognoscere valeam.'" We are unable to find any reference to the following Mexican and Central American species: *Malpighia ovata* Rose in Contrib. U.S. Herb. vol. i. no. 9, p. 310; *M. umbellata* Rose; *M. Watsoni* Rose (= *Bunchosia parvifolia* Watson in Proc. Am. Acad. xxiv. p. 42); *M. guadalajarensis* Rose (= *Bunchosia guadalajarensis* Watson in Proc. Am. Acad. xxii. p. 401); *M. dasycarpa* Donnell Smith in Bot. Gaz. xxiv. p. 390; and *M. edulis* Donnell Smith.

E. G. B.

Die Kontinuität der Atomverkettung ein Strukturprinzip der lebendigen Substanz. Von Dr. Georg Hörmann. Jena: Gustav Fischer. 1899. Price 3 marks.

In this memoir, which is a continuation of one by the same author noticed on p. 453 of this Journal for 1898, an attempt is made to obtain a clear idea of the molecular constitution of structures exhibiting the phenomena of irritability. In all these cases —nerve- and muscle-fibres, the electrical organs of fishes, and vegetable cells with rotating and circulating protoplasm—it is maintained that the several phenomena may be explained on the supposition of a closely similar molecular constitution. The ultimate

elements of the irritable organ—those by means of which a stimulus is conducted—consist of molecules called, on Pflüger's theory that cyanogen-radicles are contained in them, CN-molecules. Each of these CN-molecules is of high complexity, consisting of thousands of atoms, and it lies surrounded by unorganized (leblos) substances, such as albuminoids, carbohydrates, &c., or by organized (lebende) molecules which take no part in the conduction of a stimulus. That part of the surrounding medium lying between the CN-molecules may be unpolarisable, the rest being polarisable, or the CN-molecules may be of cylindrical form, the surfaces facing their fellows in the series being unpolarisable, while the surfaces looking towards the surrounding medium are polarisable, or, as a third alternative, the CN-molecules may stand in contact with one another. In view of the multitude of processes taking place there, the surface of the CN-molecules cannot be homogeneous, but it must be chemically heterogeneous. The CN-molecules must be regarded as having a fixed orientation, their arrangement being in longitudinal rows.

As regards the vegetable cell, the whole of its plasma-structures, including the nucleus, are, it is maintained, capable of conducting a stimulus, and they are to be viewed as consisting of a series of linked molecules (gliedermolekeln). The inability of enucleate fragments of a cell to continue living and forming cellulose walls, and the change of form undergone by the nucleus after continued application of a stimulus to certain cells, these and other facts are to be regarded as the expression of a chemical union between nuclear- and plasma-structures, and it is to this chemical continuity that the author attaches great importance. The relation between the above structures may be conceived in either of two ways: the plasma-structures may be a direct prolongation of the nuclear, or, better, may have a lateral origin from them. These laterally arising plasma-structures are supposed to form dendritic series by dichotomy and anastomosis, and so to come under Pflüger's view of the constitution of living substance as a network suspended in a fluid. We thus reach the conception of a reticulate structure of chemically continuous living molecular groups, the interspaces between which are filled with nutritive fluid.

In the *Nitella*-cell a stimulus is conducted along both the resting and the streaming layer of the protoplasm, and each of these waves of stimulation is by itself capable of bringing the streaming to a stop as a consequence of a change in the chemical relation between the respective atoms composing the layers. Rotation is therefore the result of chemical contact set up between the atom-groups of the two layers.

Dr. Hörmann displays much ingenuity in dealing with an exceedingly obscure problem, of which he gives what is perhaps the best explanation possible in the present state of our knowledge. The numerous diagrams dispersed through the text greatly assist the reader to understand his meaning.

S. M.

*ARTICLES IN JOURNALS.**

Bot. Centralblatt (No. 28).—T. Ito, 'A case of close external resemblance in Dicotyledons.' — F. Hildebrand, 'Beobachtungen und Experimente am *Oxalis*-Arten' (concl.). — (Nos. 29, 30). P. Dietel, 'Waren die Rostpilze in früheren Zeiten plurivor?'— E. H. L. Krause, 'Floristische Notizen' (cont.). — (No. 31). F. Brand, '*Cladophora*-studien' (3 pl.).— F. Ludwig, 'Beobachtungen zur Biologie von *Helleborus fœtidus*.'

Bot. Gazette (22 June). — T. Holm, *Podophyllum peltatum*.— J. Donnell Smith, New Guatemala Plants (concl.).—T. S. Brandegee, 'New Western Plants' (*Purpusia* n. g., Rosaceæ).—C. O. Townsend, 'Effect of ether upon germination.' — A. P. Anderson, *Tilletia corona*. — C. Mohr, 'Alvin Wentworth Chapman' (1809–1899: portr.).—F. A. Waugh, 'What is *Prunus insititia*?'—W. H. Evans, *Betula Kenaica*, sp. n.

Bot. Zeitung (16 June). — F. W. E. Roth, 'Jacob Theodor aus Bergzabern, gennant Tabernæmontanus, 1520–1590.' — (16 July). W. Schmidle, 'Über die Befruchtung, Keimung und Haarinsertion von *Batrachospermum*.'

Bull. Bot. Soc. Belgique (xxxvii. pt. 2; 30 June). — J. Massart, 'La dissémination des plantes alpines.'—Id. 'Un voyage botanique au Sahara.'—F. Crépin, 'Les idées d'un anatomiste sur les espèces du genre *Rosa*.' — (xxxviii. pt. 1; 30 June). T. Durand & E. De Wildeman, 'Matériaux pour la Flore du Congo' (tt. 5).

Bull. de l'Herb. Boissier (20 June).— A. Chabert, 'Sur le genre *Rhinanthus*.'—G. Hochreutiner, 'Dissémination des graines par les poissons.'—J. Briquet, 'Sur le fruit du genre *Oenanthe*.'

Bull. Soc. Bot. France (xlvi, 1–2: June).—A. Letellier, 'Action de l'électricité sur les racines.' — M. Gomont, 'Sur quelques Oscillariées nouvelles' (1 pl.).—E. Heckel, 'Présence du cuivre dans les plantes.'

Bull. Torrey Bot. Club (17 June).—C. McMillan, 'On *Nereocystis*' (2 pl.).—E. P. Bicknell, 'Studies in *Sisyrinchium*' (cont.).—A. M. Vail, 'On *Covillea* and *Fagonia*.' — E. J. Hill, 'Plants of Chicago District.' — A. A. Heller, 'Plants from Western N. America.'— B. D. Gilbert, 'Two new *Polypodia* from N. Zealand.' — G. E. Davenport, *Acrostichum lomarioides*. — F. L. Harvey, 'Myxogasters of Maine.'

Erythea (1 July).—A. Nelson, 'New species in *Oreocarya*.'

Gardeners' Chronicle (15 July).—'The Hybridization Conference.'

Journ. Linnean Society (No. 257; 1 July).— H. H. W. Pearson, 'The Botany of the Ceylon Patanas' (map). — G. O. West, 'Variation in the *Desmidieæ*' (4 pl.). — (No. 238; 1 July). S. Le M. Moore, 'The Flora of the interior of Western Australia.' — F. W. Stansfield, 'Apospory in *Athyrium Filix-fœminea* var. *uncoglomeratum*.' — I. H. Burkill & C. H. Wright, 'African *Labiatæ*

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

with alternate leaves' (1 pl.). — G. C. Druce, 'The Irish *Carex rhynchophysa*' (see p. 368). — W. & G. S. West, 'Freshwater Algæ of West Indies.'—C. B. Clarke, *Carex Wahlenbergiana*.

Oesterr. Bot. Zeitschrift (July).—S. Murbeck, *Gentiana Hedini* & *G. cordisepala*, spp. nn. — A. Zahlbruckner, 'Neue und seltene Flechten aus Istrien.' — J. Steiner, 'Flechten aus Armenien und dem Kaukasus.'—V. Folgner, 'Zur Kenntniss der Entwickelungsgeschichte einiger Süsswasser-Peridineen.'—V. v. Borbás, *Odontites pratensis*.—J. Murr, 'Zur Kenntniss der Gattung *Capsella*' (1 pl.).

Rhodora (July). — L. C. Whitney, 'Vermont Myxomycetes.'—M. L. Fernald, Two ambiguous Lysimachias (1 pl.).

BOOK-NOTES, NEWS, &c.

At the meeting of the Linnean Society on June 15th, Dr. A. B. Rendle read a paper entitled "A Systematic Revision of the Genus *Najas*," a primitive genus of monocotyledons containing about thirty known species, generally distributed in both Old and New Worlds, and consisting of submerged herbs, often of great delicacy, growing in mud in fresh or brackish water. The slender stem branches more or less profusely, and the laxity or density of branching determines the habit, which shows considerable variation. The leaves are in pairs at each node; one member of the pair is slightly older than the other, and in its axil arises a branch. The flowers, which are extremely simple, arise by the dichotomy of a branch-rudiment; the lower half forming a male or female flower, the upper the lateral branch, at the base of which the flower seems in the adult plant to stand. There is a difference of opinion as to the value of the parts of the flower, Dr. Rendle's view being that the male consists of a single anther (of axial origin) surrounded by a sac-like perianth, which is enveloped in a bottle-shaped spathe, absent only in *N. graminea*. The female consists generally of a naked ovary, terminated by two or three stigmas, and enclosing a single anatropous ovule; in a few species it is enveloped by a spathe like that of the male. The seed has a hard testa, the detailed structure of which affords useful specific characters. Others are also furnished by the shape of the leaf-sheath and the form of the marginal spines.

Mr. H. C. Shelley's *Chats about the Microscope*, issued by "The Scientific Press" (price 2s.), is specially addressed "to the aimless pedestrians"—the great majority who are in the habit of taking long country walks with no object in view. If only a few of these can be inoculated with an enthusiasm for the microscope, "who can tell what an important service may be rendered to science?" It is no worse than many other so-called popular science volumes, and conveys some idea of a few things which may be easily got for microscopic examination. The illustrations, however, will not give much help towards the elucidation of the object under examination, as they are poor and not accompanied by descriptions. The standard

of the work is that of the person who likes to "mess about" with a microscope, and shows you with equal glee the Lord's Prayer, the Royal Family, the leg of a flea, and so forth. It will enable such an one to enlarge his repertoire, and may perhaps induce him to obtain one of the more useful works to which reference is made on the last page.

In the *Journal of the Linnean Society* (No. 237, July 1) Mr. G. C. Druce publishes his reasons for concluding that the Irish sedge figured and described in this Journal for 1893 as *Carex rhynchophysa* is *C. rostrata* var. *latifolia*. We understand that Mr. Arthur Bennett concurs in that decision, so *C. rhynchophysa* must disappear from our lists. We note that Mr. Druce, following the *Index Kewensis*, cites the species as of "Fisch., Mey. & Avé-Lall. Ind. Sem. Hort. Petrop. ix. Suppl. 9." It is true that the "animadversiones" in which the plant is described is signed by these three botanists, but the name is claimed for C. A. Meyer on an earlier page (2) of the *Supplementum*, and there seems no reason to differ from Richter and other botanists, who assign the species to him exclusively.

A praiseworthy step in a direction where more are needed is "Contributions to the Bryological Flora of Southern India," by V. F. Brotherus, officially published in the *Records of the Botanical Survey of India* (vol. i. No. 12. Calcutta, 1899. Pp. 311–329). It is a "Report on a collection of mosses made by Dr. T. L. Walker in Coorg during the cold weather of 1897–98," and contains ninety-nine species, of which nineteen are new. Among the amiable features of this useful report may be mentioned the modernized classification and nomenclature, and the precision with which the habitat of each specimen is indicated—an important precaution which is usually neglected by collectors of tropical mosses. As little or nothing had been published previously upon the mosses of the southern part of the peninsula, except the Neelgherries, the present contribution to our knowledge is very welcome.—A. G.

We have received the two parts which complete the very important *Flora des Nordodeutschen Flachlands*, the earlier portions of which were noticed on p. 502 of last year's Journal. We hope to publish a full notice of the whole work, but we will not delay recommending it to British botanists, not only on account of the valuable critical information which it contains, but for its cheapness; the two parts before us contain four hundred pages of closely but clearly printed matter, and cost only 7 marks 80 pfg. (Berlin: Borntraeger).

The part of the *Icones Plantarum* issued in June is largely devoted to grasses, of which Dr. Stapf has contributed the descriptions. Mr. Rolfe describes a new genus of Orchids (*Giulianettia*) from New Guinea; and Mr. Hemsley has numerous novelties. Many of the plates, though doubtless accurate enough, leave something to be desired in the matter of execution and arrangement; the folding plate 2619, for example, is very badly arranged, and would have been more satisfactory if treated as two separate figures.

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CONTENTS.

	PAGE
Alabastra Diversa.—Part V. By SPENCER LE M. MOORE, F.L.S. (Plates 401, 402)	369
Weisia crispata in Britain. By H. N. DIXON, M.A., F.L.S.	375
The *Capriola* of Adanson. By W. P. HIERN, M.A., F.L.S.	378
New Grasses from South Africa. By A. B. RENDLE, M.A., D.Sc. ..	380
Some Plants of East Scotland. By Rev. E. S. MARSHALL, M.A., F.L.S., and W. A. SHOOLBRED, M.R.C.S.	383
A New British *Rubus*. By J. WALTER WHITE, F.L.S.	389
Bibliographical Notes:—XX. Curtis's 'Flora Londinensis.' By W. A. CLARKE, F.L.S.	390
SHORT NOTES. — *Sempervivum hierense*, sp. nov. — Hampshire Plants.—Criticisms on the *Cybele Hibernica*, ed. 2	395
NOTICES OF BOOKS:—	
Californian Hypogæous Fungi ..	397
Royal Gardens, Kew. Bulletin of Miscellaneous Information ..	399

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THE

JOURNAL OF BOTANY

British and Foreign

EDITED BY

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THE JOURNAL OF BOTANY was established in 1863 by Dr. Seemann. In 1872 the editorship was assumed by the late Dr. Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

Without professing to occupy the vast field of general Botany, the Journal has from its inception filled a position which, even now, is covered by no other periodical. It affords a ready and prompt medium for the publication of new discoveries, and appears regularly and punctually on the 1st of each month. While more especially concerned with systematic botany, observations of every kind are welcomed. Especial prominence has from the first been given to British botany, and it may safely be said that nothing of primary importance bearing upon this subject has remained unnoticed.

Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains. Many important monographs and other works first appeared in its pages. In 1896 it became necessary to increase its size, owing to the number of papers sent for publication: the number of plates was at the same time augmented.

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R Morgan lith.

A. Senecio cambrensis. B Pentstemon Penst.

Tab. 402.

B. H. undulata.

A

coccineus

ALABASTRA DIVERSA.—Part V.

By Spencer Le M. Moore, F.L.S.

(Continued from p. 175.)

(Plates 401, 402.)

Pavetta Phillipsiæ, sp. nov. Fruticosa, ramosissima, sursum foliosa deorsum nuda, ramulis subteretibus juvenilibus complanatis griseo-tomentosis, foliis petiolatis amplis ovatis vel obovatis breviter cuspidatis membranaceis supra glabris subtus præsertim in nervos piloso-puberulis, stipulis caducis ovato-rotundatis dorso plus minus hirsutis, corymbis terminalibus plurifloris abbreviatis, floribus circa 2·0 cm. long., calycis hirsuti vel subglabri lobis linearibus æstivatione apertis, corollæ extus glabræ lobis reflexis oblongo-lanceolatis acutis, antheris breviter exsertis 0·6 cm. long. tortis, stylo usque ad 1·0–1·5 cm. exserto, stigmate anguste fusiformi.

Hab. Somaliland, near the tops of the Wagga Mountains, at 6000 ft.; *Mrs. Lort Phillips* (Herb. Mus. Brit.).

Ramuli mox pallescentes, 0·2–0·3 cm. diam., cortice papyraceo annulatim rupto induto. Internodia circa 0·5–1·5 cm. long. Foliorum lamina læte viridis, 10·0 cm. long. et 6·0 cm. lat. attingens, plerumque vero brevior (5·0–8·0 × 3·0–4·0 cm.), foliorum summorum sæpe usque ad 2·0–3·0 × 1·0 cm. miniata, costæ secundariæ utrovis latere plerumque 8; petioli modici 0·5–0·7 cm. long., hirsutulo-pubescentes. Stipulæ 0·25 cm. long. Calyx subcylindricus, 0·4–0·5 cm. long. Corolla (ex schedis cl. inventricis) alba, intus ima basi minute puberula ceterum glabra; tubus basi 0·15 cm. sub limbo vix 0·25 cm. diam.; lobi 0·8 cm. long. Antheræ breviter caudato-apiculatæ. Fructus ignotus.

A species much in the style of *P. abyssinicus* Fres. It seems nearest, however, to *P. olivaceo-niger* K. Schumann, from which it is certainly different on account of its leaves glabrous on their upper side, the diverse indumentum of its inflorescence, differently shaped calyx-lobes and corolla, smaller stamens, and more markedly fusiform stigma. Though Mrs. Lort Phillips's specimens vary somewhat among themselves, they all appear referable to the same species. A specimen collected by Miss Edith Cole, in the Herbarium at Kew, though not quite identical with any of the Museum ones, will probably prove to be a variety of the above.

Vernonia (§ Decaneuron) **Randii**, sp. nov. Fruticosa, arcte tomentosa, foliis alternis subsessilibus lanceolato-oblongis breviter acuminatis basi obliquis et parum attenuatis dentatis denticulatisve nonnumquam solummodo undulatis, paniculis terminalibus dense capitulatis, capitulis 9–10-floris campanulatis pedunculis subæquilongis, involucri phyllis pluriseriatis ovatis obtusissimis margine ciliatis, achæniis setulosis in longitudinem costatis, pappi setis uniseriatis barbellatis pallide albido-virescentibus.

Hab. Salisbury, Rhodesia; *Dr. R. Frank Rand*, July, 1898 (Herb. Mus. Brit.).

Frutex laxus (ex cl. detectori). Rami validi, subteretes, striati, dein glabrescentes, 0·4 cm. diam. Folia 2·5–4·0 cm. long, 0·8–1·5 cm. lat. (summa vero miniata), pagina superiori mox fere glabra, firma, costæ secundariæ utrovis latere circa 12, subtus eminentes; petioli 0·3–0·4 cm. long. Involucri 0·35 cm. long. et vix 0·5 cm. lat. phylla pallide virentia, margine et sæpe apice decoloria. Receptaculum planum, areolatum, glabrum. Corolla alba, in toto 0·8 cm. long., deorsum glanduloso-papillosa, basi 0·07 cm. diam. sursum usque 0·16 cm. ampliata; lobi lanceolati, acuti, 0·2 cm. long. Antherarum basi productarum apices anguste lanceolato-lineares. Achænia 0·2 cm. long., glandulis minutis onusta; pappi setæ 0·6 cm. long., inter se subæquales.

Allied to *V. amygdalina* Delile, from which it can easily be distinguished by the very shortly-stalked leaves but little narrowed at the base, by the few-flowered capitula, the broad firm very obtuse involucral leaves, and the pale whitish-green pappus.

Detris smaragdina, sp. nov. Herbacea, parvula, laxa, a basi ramulosa, piloso-pubescens, ramulis gracilibus sparsim foliosis, foliis sessilibus anguste linearibus obtusis membranaceis, capitulis terminalibus vel axillaribus, involucri late campanulati phyllis biseriatis lanceolatis acuminatis margine albo-membranaceis, ligulis involucrum faciliter excedentibus et saltem in sicco smaragdinis, achæniis compressis.

Hab. Damaraland; *T. G. Een*, 1879 (Herb. Mus. Brit.).

Stirps debilis circa 8·0 cm. alt. Radix sat validus, 0·15 cm. crass., sparsim fibrillosus. Folia modica 1·0–1·5 cm. long., vix vel paullo ultra 0·1 cm. lat., integra vel evanide serrulata. Involucra 0·4 cm. long., 0·6 cm. lat.; phylla dorso strigoso-pilosula, margine ciliata. Radii flosculi 0·1 cm. long., et horum ligula lineari-oblonga, obtusissima, 0·8 cm. long.; disci flosculi 0·3 cm. long. Achænia oblonga, utrinque paullulum angustata, vix 0·2 cm. long., margine obscure ciliolata; pappi setæ 0·3 cm. long., serrulatæ nec profecto plumosæ.

A plant much in the style of some forms of *Detris tenella* (*Felicia tenella* DC.)—*e. g.* Schlechter's No. 8327—but easily distinguished by its different grass-green ligules and the fewer disc-florets.

Helichrysum (Argyreia § Leptorhiza) **marmarolepis**, sp. nov. Planta gracilis, fere a basi patenti-ramosa, araneoso-tomentosa, deinde plus minus glabra, foliis sparsis sessilibus linearibus obtusis vel mucronulatis, capitulis parvis ad apicem ramulorum numero 5–10 arcte aggregatis anguste campanulatis circa 20-floris, involucri phyllis 5-seriatis paucibus extimis late ovatis membranaceis intermediis et intimis late spathulatis et appendice erecto-convexa alba firma obtusissima coronatis, achæniis glabris, pappi setis albis.

Hab. Namaqualand; *W. C. Scully* (No. 219 in Herbb. Mus. Brit. & Kew.).

Radix deest. Planta circa 24·0 cm. alt. Ramuli teretes, filamentosi, deinde glabri et brunnei. Folia circa 1·0 cm. long., 0·15 cm. lat., margine leviter undulata, membranacea. Capitulorum glomeruli circa 1·0 cm. diam. Capitula 0·3 cm. long., 0·2 cm. lat.

Flosculi 0·2 cm. long. Achænia vix 0·1 cm. et pappi setæ 0·2 cm. long.

Allied to *H. expansum* Less., from which it can be told by the usually more numerous florets to its smaller, differently shaped and more closely aggregated capitula, whose inner involucral scales have a shorter and relatively broader appendage. The appendages are convex, not flat, and have a solid marbly appearance, whence the specific name. Although not easily described in words, the differences between the two species here contrasted are sufficiently striking when the plants are carefully examined.

Helichrysum (Chrysolepidea § Stæchadina) **Danaë,** sp. nov. Rhizomate crasso lignoso, caule subtereti araneoso-pubescente apice dense aggregato-paniculato, foliis sparsis sessilibus inferioribus oblanceolatis acutis deorsum gradatim extenuatis basi vaginato-amplexicaulibus sparsim pilosis glandulis nigris crebro conspersis foliis superioribus parvis linearibus, capitulis parvis paucibracteatis cylindricis circa 10-floris breviter pedicellatis in paniculum densum aggregatis, involucri phyllis erectis pluriseriatis lanceolatis acuminatis aureis extimis plus minus araneosis decoloribus fusco-uninerviis, achæniis papillosis, pappi setis albis.

Hab. Zululand; *Gerrard* (Herbb. Mus. Brit. & Kew., *sine no.*).

Planta circa 17 cm. alt. Folia inferiora 7·0–8·0 cm. long., 1·0–2·0 cm. lat., minora vero 2·5–3·0 cm. × 0·8 cm. exstant, membranacea, in sicco viridia, margine leviter undulata; folia superiora circa 1·0 cm. long., fere glabra, in sicco subscariosa. Paniculus 4·0 cm. diam. Bracteæ subulatæ, scariosæ, circa 0·3 cm. long. Capitula 0·6 cm. long., 0·25 cm. lat. Involucri phylla extima 0·4 cm. interiora 0·5 cm. long., hæc modo 0·1 cm. lat. Receptaculum nudum. Flosculi vix maturi 0·2 cm. long. Achænia 0·07 cm. et pappi setæ vix 0·3 cm. long.

Closely allied to *H. floccosum* Klatt, from which its smaller almost glabrous leaves, more closely congested narrower capitula (a character seen still more strikingly in comparison with Rehmann, No. 6092, which is certainly *H. floccosum* Klatt), narrower acuminate involucral leaves, and papillose achenes, are points whereby it can readily be told.

Helichrysum (Lepicline § Plantaginea) **homilochrysum,** sp. nov. Humilis, dense lanata, caule crebro folioso sursum leviter ramuloso, foliis sessilibus ovatis vel rotundatis obtusissimis margine undulatis superioribus paullo minoribus, capitulis cylindrico-campanulatis circa 20-floris pedicellatis in paniculum densum aggregatis, bracteis paucis involucri phyllis extimis similibus nisi angustioribus, receptaculo alveolato, involucri phyllis pluriseriatis erectis exterioribus obovato-oblongis basi lanatis intimis paucis lineari-oblongis vel linearibus omnibus obtusissimis retusisve aureis, achæniis papillosis, pappi setis albis.

Hab. Lydenburg district, Transvaal; *Dr. F. Wilms* (No. 716 in Herbb. Mus. Brit. & Kew.).

Planta 10 cm. alt. Rhizoma nondum obvium. Folia modica 1·5–2·5 cm. long., usque 2·0 cm. lat., plerumque vero angustiora,

crassiuscula. Paniculus usque 4·0 cm. diam. Capitula 0·6 cm. long., vix 0·5 cm. lat. Involucri phylla extima 0·45 cm. long., 0·23 cm. lat., intima 0·5 cm. long., 0·1 cm. lat. Achænia vix 0·1 cm. long.; pappi setæ flosculis paullo breviores, 0·3 cm. long.

Distributed as "*Helichrysum* affin. *crassifolio* Less.," but this, on investigation, turns out not to be the true affinity. The plant here described seems to come nearest *H. crispum* and its allies, from all of which, however, it is markedly different.

Helichrysum (Lepicline § Aptera) **Mimetes**, sp. nov. Erecta, araneoso-tomentosa, caule tereti folioso sparsim ramoso, foliis petiolatis ovatis apice mucronulatis deorsum leviter gradatim angustatis supra deinde glabratis subtus cano-tomentosis, capitulis parvis cylindraceis 12-floris pedicellatis in paniculum pauci- vel pluricapitulatum sublaxiuscule dispositis aureo-stramineis, bracteis late oblongis vel lanceolatis acutis, involucri phyllis pluriseriatis erectis exterioribus ovatis intimis linearibus vel lineari-oblongis obtusissimis, receptaculo paleis lanceolatis sordide albidis onusto, achæniis glabris, pappi setis albis.

Hab. Lydenburg district, Transvaal; *Dr. F. Wilms* (No. 727 in Herb. Mus. Brit.).

Planta ultra 20 cm. alt. Caulis gracilis, ætate glabrescens et in longitudinem striatus. Folia 1·0–1·5 cm. long., 0·8–1·2 cm. lat. (pauca superiora vero minora), membranacea; petioli usque 0·7 cm. long., plerumque vero breviores. Paniculus rami principalis usque 3·0 cm. diam., ramulorum 1·0–1·5 cm. diam. vel etiam minor. Bracteæ conspicuæ, usque 0·4 cm. long. Capitula 0·4 cm. long., 0·3 cm. lat. Achænia 0·07 cm. et pappi setæ 0·25 cm. long.

This has been distributed as *H. petiolatum* DC., a plant greatly resembling it in foliage, but with quite different capitula. *H. Mimetes* should be placed next *H. revolutum* Less., from which its peculiar leaves and fewer-flowered capitula serve at once to distinguish it.

Metalasia Massoni, sp. nov. Caule erecto ramulos breves ascendentes foliatos apice cymoso-capituliferos crebro emittente, foliis subulatis acute mucronatis patentibus tortis, cymis 4–6-capitulatis adjectis aliis ad apicem caulis aggregatis, capitulis brevipedunculatis anguste cylindricis 5–6-floris, involucri aliquantulo araneosi phyllis exterioribus lanceolatis acutis interioribus triseriatis appendicibus petaloideis oblongis acutis lacteis onustis, pappi setis obscurissime clavellatis.

Hab. Cape Colony; *Francis Masson* (Herb. Mus. Brit.).

Caulis circa 0·2 cm. diam., appresse pubescens. Ramuli capituliferi intervallis 0·5–1·0 cm. long. orti et se ipsi totidem long. Folia modice 0·3–0·5 cm. long., supra tomentosa, subtus nitentia, puberula. Capitula 0·7 cm. long., medio vix 0·2 cm. lat. Involucri phylla extima 0·25 cm. long.; intermedia usque 0·5 cm. long.; intima petaloidea, erecto-patentia, 0·6–0·7 cm. long. Flosculorum circa 0·3 cm. long. limbus roseus. Achænia nondum matura 0·12 cm. long. Pappi setæ serrulatæ, 0·4 cm. long.

The candelabrum-like arrangement of the cymes all up the main stem is a mark whereby this species can at once be told from its congeners.

Eenia Hiern & S. Moore, Compositarum e tribu Inuloidearum genus novum (Tab. 401 A).—Capitula homogama, discoidea, pluriflora, floribus omnibus hermaphroditis fertilibus. Involucrum late campanulatum, subhemisphæricum, bracteis pauciseriatis angustis exterioribus brevioribus. Receptaculum leviter elevatum, alveolatum, paleis membranaceis concavis deciduis flosculos omnes singillatim amplectentibus, onustum. Corolla actinomorpha, sursum ampliata, 5-loba. Antheræ basi sagittato-caudatæ. Styli rami leviter complanati, lineares, apice obtusi nequaquam truncati, dorso minute papillosi. Achænia (nondum matura) teretiuscula. Pappus simplex, e paleis 5 brevibus varie laceratis et cupulam mentientibus compositus. Suffrutex? minute albide furfuraceo-tomentosus, deinde glaber. Folia alterna, sessilia, plerumque triloba, summa miniata et nonnunquam integra. Capitula parva, corymbosa. Corollæ verisimiliter flavæ vel aurantiacæ.

Eenia damarensis Hiern & S. Moore, sp. unica. Caule subtereti, striato, foliorum 1·0–2·0 cm. long. lobis linearibus lobo medio plerumque circa 1·0 cm. long. et 0·1–0·2 cm. lat. lateribus 0·2–0·5 cm. long. rarius lobo medio subæquilongis, capitulis circa 0·7 cm. long., vix 1·0 cm. diam., involucri bracteis exterioribus vix 0·3 cm. interioribus 0·4 cm. long. oblanceolatis obtusis in sicco stramineis margine breviter hyalinis, paleis oblanceolatis trifidis 0·3 cm. long., corollæ 0·4 cm. long. deorsum 0·03 cm. sursum 0·07 cm. diam. lobis lanceolatis 0·06 cm. long., antherarum apicibus lanceolatis, achænio 0·12 cm. long. 0·03 cm. diam., pappo circa 0·04 cm. long.

Hab. Damaraland; *T. G. Een*, 1879 (Herb. Mus. Brit.).

This is a plant with somewhat the look of a *Schistostephium*, but its tailed anthers, although the tails are but short, and rounded not truncate style-arms, must keep it out of the tribe *Anthemideæ*. Its true affinity seems to be with the subtribe *Buphthalmeæ* of the *Inuloideæ*, among which it may be noted as being one of the few discoid genera. The immediate neighbourhood of *Sphacophyllum* and *Callilepis* seems to us to be its proper position in the order, though from both of them it differs in important points of structure.

Geigeria Eenii, sp. nov. Suffrutex erectus, sat validus, sparsim necnon brevissime ramosus, foliis alternis sessilibus linearibus obtusis integris vel denticulatis uninerviis glabris, capitulis inferioribus ad apicem ramulorum perbrevium foliis miniatis involucratis solitariis capitulis superioribus in cymam densam foliis majoribus involucratam aggregatis, involucri ovoidei phyllis oblongo-ovatis exterioribus et intermediis acutis vel acuminatis intimis simpliciter vel debiliter spinuloso-acuminatis omnibus præsertim in marginem araneosis, receptaculo convexo, pappi paleis exterioribus 6 muticis interioribus 6 aristatis arista paleis æquilonga.

Hab. Damaraland; *T. G. Een*, 1879 (Herb. Mus. Brit.).

Radix pinguis, sparsim fibrillosus. Caulis 15·0 cm. alt., eximie striatus, 0·35 cm. diam., deorsum ramulos nec ultra 0·3 cm. long. foliis paucibus parvis capitulum solitarium involucrantibus onustos

ferens. Folia summa 5·0–6·0 cm. long., 0·2–0·4 cm. lat. (rarissime usque 8·5 × 0·7 cm.), inferiora pleraque 2·0–3·0 cm. pleraque 0·5–1·0 long., omnia coriaceo-membranacea, in sicco viridia, utrinque glandulis impressis crebro innotata. Capitula circa 0·7 cm. diam. Involucri 0·8 cm. long. et 0·5 cm. lat. phylla exteriora coriacea, interiora membranacea.

The very short branches which spring from the lower part of the stem and are crowned each by a solitary capitulum, give this plant a curious appearance. It differs from *G. Luederitziana* O. Hoffm. (known to me by description only) in the habit, the massed capitula at the top of the stem, those of *G. Luederitziana* being always solitary, in the differently shaped capitula, in the outer involucral leaves being without a foliaceous appendage. *G. ornativa* O. Hoffm., which also I have not seen, agrees with the plant here described in having its capitula sometimes solitary, sometimes aggregated; but the habit is different, its larger leaves are penninerved, its involucres are described as being globose and their outer leaves as having a foliaceous appendage, the receptacle is conical, and the awns of the five inner pappus-paleæ are shorter than the paleæ themselves.

Geigeria Randii, sp. nov. Suffrutex erectus, ramosus, rarifolius, foliis alternis planis linearibus obtusis vel breviter mucronato-apiculatis uninerviis subtus appresse pubescentibus dein glabris, capitulis solitariis vel sæpius in cymas pauci-(3–9-)capitulatas foliis involucratis congestis, capitulis ovoideis, involucri phyllis exterioribus ovatis acutis interioribus lanceolatis mucronato-acuminatis omnibus araneosis deinde glabris, receptaculo convexo, pappi paleis exterioribus 5 muticis interioribus 5 arista quam se ipsæ breviore terminatis.

Hab. Buluwayo, Rhodesia; *Dr. R. Frank Rand*, May, 1898 (Herb. Mus. Brit.).

Caulis saltem 30·0 cm. alt., sursum (solummodo sub capitulis) foliatus, in longitudinem striatus, puberulus mox glaber. Folia 4·0–7·0 cm. long., nonnulla vero breviora, 0·2–0·4 cm. lat., deorsum attenuata, margine obscure undulata, in sicco atrata, coriaceo-membranacea. Involucri 0·8 cm. long. 0·5–0·6 cm. lat. phylla omnia membranacea.

Allied to the last, but quite different in habit and leaf. The membranaceous outer involucral leaves and inner paleæ of the pappus longer than their awns are also points worthy of mention.

Geigeria pubescens, sp. nov. Suffruticosa, ascendens, ramosa, crebro foliosa, pubescens, foliis sessilibus alternis suboppositisve planis lineari-lanceolatis mucronatis integris vel breviter calloso-denticulatis decurrentibus nunc uni-nunc obscure penninerviis, capitulis in cymas pauci-(circa 3–6-) vel pluri-capitulatis aggregatis, involucri ovoidei plus minus araneosi phyllis exterioribus late oblongis brevissime foliaceo-appendiculatis intermediis oblongis cuspidulatis intimis lanceolatis acutis obtusisve, receptaculo convexo, pappi paleis exterioribus 5 muticis rarius breviter aristulatis interioribus 5 arista sibi ipsis æquilonga munitis.

Hab. Buluwayo, Rhodesia; *Dr. R. Frank Rand*, May, 1898 (Herb. Mus. Brit.).

Caulis sat robustus, circa 0·4 cm. diam., striatus, deinde glaber. Folia modica 3·0–5·0 cm. long., 0·4–0·8 cm. lat., in sicco plus minus atrata, membranacea. Involucri 0·7 cm. long. circa 0·4 cm. lat. phylla omnia membranacea.

Near the last two, but easily distinguished by its indumentum, linear-lanceolate leaves, and always congested capitula; also by the shape of the involucral scales, and the outer pappus-paleæ sometimes ending in a short awn.

GEIGERIA PROTENSA Harv. var. PUBIGERA nob. A typo discrepans ob indumentum minute tomentosum mox pubescens.

Hab. Buluwayo, Rhodesia; *Dr. R. Frank Rand*, Dec. 1897 (Herb. Mus. Brit.).

(To be continued.)

WEISIA CRISPATA IN BRITAIN.

By H. N. DIXON, M.A., F.L.S.

Weisia crispata was first published, as *Hymenostomum crispatum*, by Nees and Hornschuch in the *Bryologia Germanica* (ed. 1, 1823). Under this name, too, it was described and figured in the Bry. Eur. Schimper, in the second edition of the *Synopsis*, maintains it as a species, with a doubtful "an satis distinctum?" His example, coupled with his doubt, has been for the most part followed by other authors, but of late the doubt has preponderated, and Husnot, in the Musc. Gallica, has reduced it to a variety of *H. tortile*, "feuilles plus longues, à bords plus fortement involutés; orifice de la capsule plus étroit." Boulay asks with point, "If the var. *subcylindricum* of *tortile* be admitted, what is there to separate *H. tortile* and *H. crispatum*?" Anyone who knows the variations of *W. tortilis* will, I think, admit that a slight difference in the width or length of the leaves or in the form of the capsule cannot be admitted as affording a satisfactory specific character.

Limpricht, however, in his *Laubmoose*, &c. (i. 254), has put quite a fresh complexion on the matter. He unites with it *Weisia gymnostomoides* Brid. (*W. viridula* var. *gymnostomoides* Bry. Eur. et plur. auct.), and describes it, for the first time, so far as I am aware, as peristomate, under the name of *Weisia crispata* (Bry. Germ.) Jur. Laubm. v. Oesterr.-Ung. 11 (1882).*

I have lately received from Mr. J. A. Wheldon a plant gathered in N.W. Lancashire by Mr. A. Wilson in February of this year, labelled "*W. tortilis* peristomate?" Subsequently Mr. Wilson and Mr. Wheldon were able to supply a larger quantity gathered from several localities within the same district, and in more mature

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* This appears to be an error. Juratzka (*l. c.*) cites it as *W. crispata* C. M. It should stand as *W. crispata* C. M. *Synopsis*, i. 662 (1849).

condition, and I have no hesitation in referring them all to the plant described as *W. crispata* by Limpricht.

I am not in a position to discuss the correctness of Limpricht's views as to the plant of Nees and Hornschuch, or as to its identity with the *W. gymnostomoides* of Bridel, but I have no reason to doubt their accuracy. Nor do I propose to consider here the claims of *W. crispata* to specific rank; my purpose is solely to record it as a British plant, and to point out how Limpricht's view clears up some difficult points in the relationship of this group of species, about which there has been, and still exists, much confusion. The characters of *W. crispata* as described by Limpricht are at least well defined; and if those which distinguish it from *W. tortilis* on the one hand and *W. viridula* on the other are not of the highest importance, the same may be said of several others of the group.

W. crispata differs from *W. tortilis* in no character of any importance but the presence of a rudimentary but quite distinct peristome, which, as the teeth are inserted considerably below the orifice, and are usually of but two or three articulations in height, scarcely appears above the mouth of the capsule unless the latter be slightly compressed, when under a low power it is readily seen. The teeth are pale, somewhat truncate or irregular at apex, and finely punctulate.

The leaves are narrower than in typical *W. tortilis*, but not more so than frequently occurs in that plant, especially in the forms that pass under the name of var. *subcylindricum* Schp., with which the present plant has at times no doubt been confounded.

I proceed to point out the distinguishing characters of the closely allied plants, *W. tortilis*, *W. crispata*, *W. microstoma*, and *W. viridula*. If a large series of these be examined, it is seen that the leaves fall into two distinct classes. In one, which may be described as the "*viridula*" type, they are narrow, pale, usually gradually tapering towards the point, with the margin narrowly incurved, and with a narrow, pale (rarely slightly reddish) nerve, in its widest part generally from 30 μ to 40 μ in width, not often attaining 50 μ, and very rarely indeed slightly exceeding that width.

In the second, which may be termed the "*tortilis*" type, they are broader, less tapering above, frequently markedly obtuse at apex, with the margins more widely enrolled, often so as to reach to the nerve, which itself is stout, red, often indeed reddish in the young leaves, and much wider, usually in its widest part from 60 to 80 μ, and often more, reaching as much as 100 μ; and rarely so narrow as 50 μ.

Under the first head come *W. viridula* and *W. microstoma*, while the second group comprises *W. tortilis* and *W. crispata*. *W. microstoma* also differs from all the others in the larger spores, 18–25 μ in diameter, in which respect it agrees with *W. mucronata*. In the others the diameter of the spores is about 12–18 μ. *W. microstoma* is marked too by a usually shorter seta, and a shorter and smaller capsule, than in either *W. tortilis* or *W. crispata*. *W. viridula* has

the longer seta and often the more elongated capsule of *W. crispata*, but as a rule the capsule is of a much brighter, reddish brown colour, not of that dull dun colour which characterizes *W. microstoma* and, perhaps in a less degree, *W. tortilis* and *W. crispata*.

The characters of these allied species may be tabulated thus :—

Leaves slender, nerve 30–40 μ in width, rarely reaching 50 μ; leaf-margin narrowly involute ..	Peristomate ..	Spores 12–18 μ.	*W. viridula*.
	Gymnostomous	Spores 18–25 μ.	*W. microstoma*.
Leaves wider, nerve 60–80 μ in widest part, rarely less than 50 μ; leaf-margin widely involute	Gymnostomous	Spores 12–18 μ.	*W. tortilis*.
	Peristomate ..	Spores 12–18 μ.	*W. crispata*.

I have not had an opportunity of examining a large number of specimens of "*Weisia viridula* var. *gymnostomoides*," but all that I have seen have the "*tortilis*" type of leaf, and should undoubtedly be placed under *W. crispata*. Whether or not there may be also a true variety of *W. viridula* with the peristome as rudimentary as *W. crispata* but with the "*viridula*" leaves is of course another matter; but Limpricht had evidently seen none, and I am inclined with him to doubt its existence. In that case the var. *amblyodon* B. & S. represents the most degenerate type of peristome known in *W. viridula*.

The conclusions here arrived at will, I fear, necessitate a considerable amount of rearrangement in herbaria; but I believe that they are in accordance with the facts, and that using the leaf-characters given above as guides the plants will be found to fall into well-defined groups, and the classification will be on a far more satisfactory basis. Whether the presence of a rudimentary peristome is sufficient to separate *W. crispata* specifically from *W. tortilis* is of course another matter, which it is hardly needful to discuss here. Its existence, taken with the absence of any other reliable distinguishing character, may at least be held a strong argument against the unscientific separation, generically, of *Gymnostomum* or *Hymenostomum* from *Weisia*.

Weisia crispata, like *W. tortilis*, is a limestone plant by preference. Mr. Wheldon writes that it is abundant on the scar limestone of N.W. Lancashire, and it extends into Westmoreland and Yorkshire (Ingleton), as shown by specimens (labelled *W. viridula* var. *gymnostomoides*) sent from there by Prof. Barker. I have also seen it from several localities in Derbyshire, and Mr. D. A. Jones has quite recently sent it from Carnarvonshire. On the scar limestone it grows "in rock-crevices, its compact cushions being very distinct, as also its yellowish colour, rufous in the interior of the tufts. It is often associated with *Funaria calcarea* and *Bryum murale*." Other associates, Mr. Wheldon writes later, are *Polygonatum officinale*, *Lastrea rigida*, *Polypodium calcareum*, *Hypnum rugosum*, and *Scapania aspera*.

The list of localities here given will probably be considerably added to if herbarium specimens labelled *W. tortilis* and *W. viridula* var. *gymnostomoides* be carefully examined for peristome and nerve.

THE *CAPRIOLA* OF ADANSON.

By W. P. Hiern, M.A., F.L.S.

According to the *Index Kewensis* and other good authorities, the genus *Cynodon* Rich. (1805) enjoys as synonyms *Capriola* Adans. (1763), *Dactilon* Vill. (1787), and *Fibichia* Koel. (1802); and Dr. O. Kuntze, accepting the first of these synonyms as being the oldest generic name, has called our grass *Capriola Dactylon* O. K. (1891); the Linnean name was *Panicum dactylon* (1753), and the name in familiar use is *Cynodon Dactylon* Pers. (1805).

But a doubt has been raised, calling in question the correctness of the change. Mr. Theodor Holm, of the United States Department of Agriculture, Washington, D.C., discussed the question in the *Botanical Gazette*, xxv. pp. 47–52 (Jan. 1898); he said (p. 48): "The fact is that *Capriola* was intended for *Panicum sanguinale* or for *Cynodon*, or perhaps for both together, but in no instance has this name been applied to any plant which can be identified with absolute certainty as the Bermuda grass, the genus *Cynodon* of Richard in Persoon's *Synopsis*," and, after considering and weighing the antiquarian evidence deducible from the older botanical authors, he declared that "by bringing all these statements together, drawn up from the various writers as far back as we have been able to trace our *Panicum* and *Cynodon*, it does not appear that *Capriola* was ever intended for *Cynodon* alone, but rather for *Panicum sanguinale*. The constant quotation of *Capriola* and *Sanguinaria* together seems to indicate that these were merely synonyms. . . . Adanson is correct in applying *Capriola* to a grass. But this author does not seem to have had any reason for assigning the name *Gramen dactylon*, this name being yet too obscure."

On referring to Adanson's *Familles des Plantes* (1763) it is seen that, in addition to the short character (ii. p. 31) assigned to *Capriola*, which is applicable to *Cynodon*, although not sufficiently diagnostic, there is quoted in the index (ii. p. 532), "Capriola, *Leonic.* Gramen dactylon. *offic.*" From this entry it is learnt that Adanson intended for his plant the *Capriola* of Leoniceno, and that he considered it represented by the plant then known as the officinal *gramen dactylon*. The reference to Leoniceno, professor of medicine at Ferrara, must have been to the treatise, '*Nicolai Leoniceni* viri doctissimi de Plinii et aliorum medicorum erroribus liber,' a very scarce book, apparently not seen by either Dr. Kuntze or Mr. Holm; on p. 127 (1529), beside the name *Sanguinaria* in the margin, the following passage is pertinent to this question:—

"Est enim herba apud autorē de simplici medicina, quem aliqui putant fuisse Apuleium, galli crus, atque etiā sanguinaria nominata: quod etiā nomen uitiatum est, seu decurtatū apud Dioscoridem: nam sanguinari pro sanguinaria in multis codicibus legitur: De hac autem herba idem autor de simplici medicina, quicūque sit, refert eadem quæ de coronopode Dioscorides, quod uidelicet in locis asperis, & circa uias: addit autem et rationē curtam galli crus, quàm etiam sanguinaria nominetur, eò quod seilicet naribus

imposita sanguinem fluere facit, & habet, ut inquit, in summitate pedem galli. Hæc autē herba ipsa si quàm sit uulgo nota, & simul eius nomen uulgare manifestauero, uereor ne Auicennæ, atq; eius Expositoribus magnam pariam ignominiā, qui in re notissimapueris hæsitarint. Uerum ista cælare non est tam parcere antiquis, quàm uitam negligere, quæ ut antea diximus, sub Auicennæ atq; eius Expositorium autoritate periclitatur. Hæc proculdubio illa est quam partim sanguinariam ab effectu iam dicto, partim capriolam uulgo appellamus, Plinius unam speciem graminis facit, & grameu uocat aculeatum, quoniam ei in acumine aculei sint plurimi, quos ut idem Plinius inquit, conuolutos naribus inserunt, extrahuntq; ciendi sanguinis gratia."

The meaning of this passage, so far as it bears upon the present question, appears to be that among the mistakes of Pliny which the author dealt with, was the case of *Sanguinaria*, and that this mistake consisted in his making the two plants, which the Italians called *sanguinaria* and *capriola* respectively, into one species of grass. On referring to Parlatore, *Flora Italiana*, i. pp. 125–126 (1848), 223–224, it appears that the plants which have these Italian names are *Digitaria sanguinalis* Scop. and *Cynodon dactylon* Pers. respectively; it is therefore clear, notwithstanding the fact that writers between Loniceno and Adanson had confused again those grasses, that the former author intended in using the Italian name *capriola* to mean *Cynodon* Rich., and to exclude *Panicum sanguinale* L.

In order to understand what Adanson meant by the officinal *gramen dactylon*, reference may be made to Scheuchzer's *Agrostographia* (1719), the standard book on grasses and allied plants, which was frequently quoted by Linnæus, and is given under its author's name in a list prefixed to the *Species Plantarum* (1753). Scheuchzer gives (pp. 93–112) an enumeration of the finger-grasses, "Dactyloidea dicta," which comprises seventeen species; this list contains thirteen grasses into the names of each of which the words *gramen Dactylon* enter, and of these thirteen only one is called officinal, and none of the species not called *gramen Dactylon* are officinal; this sole officinal finger-grass is called (p. 104) *Gramen Dactylon, radice repente, sive officinarum*. There is therefore sufficient reason to believe that this was the plant intended by Adanson, and the same was also quoted by Linnæus, Sp. Pl. ed. 1, p. 58 (1753), for his *Panicum dactylon;* moreover, the other synonyms quoted by Linnæus, *l. c.*, were alike quoted by Scheuchzer, *l. c.*, p. 104. The conclusion seems irresistible that *Capriola* Adans. was founded upon the same species as *Cynodon* Rich.; and there is no ground for thinking that Adanson included in the former genus the *Panicum sanguinale* L.

NEW GRASSES FROM SOUTH AFRICA.

By A. B. Rendle, M.A., D.Sc.

Before his departure for the Cameroons last February, Mr. Rudolph Schlechter entrusted me with the working out of the grasses which he collected on his expedition to western South Africa in 1897–8. There are altogether fifty species and varieties, including several hitherto undescribed. Some of the latter I have been able, by Dr. Stapf's kindness, to match with species which will shortly be published in the continuation of the Grasses of the *Flora Capensis*. Others, however, are not found in the Kew Herbarium, and of these I append descriptions. The only one of special interest is the last, which forms the second species of the peculiar South African genus *Urochlæna*, a characteristic of which is the separation when mature of the whole inflorescence partially enclosed in the spathe-like sheath of the uppermost leaf of the culm.

Ehrharta Schlechteri Rendle, sp. nov. Annua radice fibrosa, cæspitosa, culmis geniculatis erectis; foliis glaucis, vaginis compressis, ligula truncata fimbriata, lamina lineari vel anguste lineari-lanceolata acuta; pannicula angusta flexuosa, spiculis oblongis, glumis binis externis æqualibus ellipticis subacutis glabris spiculam æquantibus, gl. iii–v pilosis, gl. iii anguste-lineari quam gl. iv duplo minore, gl. iv elliptica mucronulata vel subaristata, gl. v fertili late elliptica obtusa, grano oblongo compresso.

Plants 20 to 40 cm. high, root-fibres long, thread-like; culms slender, with four to five internodes; nodes glabrous; sheaths striolate appressed, ultimately shorter than the internodes; ligule 1·5 mm. long; leaves 4 to 12 cm. long by 2 to 4 mm. broad, the shorter stronger and broader with a prominent scaberulous margin. Panicle to 11 cm. long, barely 2 cm. broad at the base, tapering upwards, branches short and slender, whorled, six or fewer at each node, the largest 2·5 cm. long, bearing five or fewer spikelets. Spikelets barely 5 mm., pedicels glabrous 2 to 5 mm. long; outer pair of glumes green with membranous white margins and apex, 7-nerved; gl. iii a little over 2 mm. long, hairy above the middle, the hairs exceeding the blunt apex; gl. iv 7-nerved, the shiny midrib and sides pilose, 4 to 4·5 mm. long; fertile gl. 7-nerved, midrib pilose except at the base, 3·3 mm. long; grain a little over 2 mm. long.

Near *E. calycina* Sm. (*E. undulata* Nees), but distinguished by the small inconspicuous third glume.

No. 8133.

E. pusilla var. inæquiglumis Rendle, var. nov. Distinguished from the type, which it otherwise resembles, by the marked inequality of the inner pair of glumes (glumes iii and iv), the short weak awn of the lower scarcely exceeding the outer glume.

No. 8361.

Agrostis Schlechteri Rendle, sp. nov. Annua cæspitosa scaberula, culmis erectis foliatis; foliis linearibus acutis; pannicula ellip-

soidea vel ovata, rachi cum ramis ramulis et pedicellis scabridulis; radiis verticillatis plus minus patentibus in parte inferiore nudis, pedicellis quam spiculæ sæpius brevioribus; glumis sterilibus ovatis acutis cum carina scabridula ceterum glabra; gl. fertili dense albopilosa, cum arista dorsali duplo longiore.

The tall flowering culms reach nearly 1 m. in length, and contain generally four elongated internodes increasing rapidly in length upwards; the few lowest shortened internodes are clothed with the short sheaths of leaves, the flat linear suberect blades of which form a tufted growth 10 to 12 cm. high; cauline leaves erect, rigidulous, more or less convolute with subpungent apex, 4·5 to 10 cm. long, and 2 mm. broad at the base; ligule brittle, scarious, 4 to 5 mm. long. Panicle 10 to 12 cm. long, 7 cm. or less in breadth; branches filiform, two to five at each node, the longest reaching 7 cm.; spikelets a little over 3 mm. long, becoming brown with a reddish tinge; outer barren glume the length of the spikelet, mucronulate, the inner acute slightly shorter and narrower; fertile gl. 5-nerved, broadly oblong when open, narrowing slightly to the truncate 4-toothed apex, outer pair of teeth larger formed by the excurrent outermost nerves, densely pilose on back, awn 5 mm. long, kneed below the middle, callus shortly hairy; pale flat hyaline ovate-lanceolate, 2 mm. long; rhachis end slender, pilose, 1 mm. long.

Near *A. lachnantha* Nees, but distinguished by its larger conspicuously awned spikelets.

No. 10274.

A. aristulifera Rendle, sp. nov. Planta minor annua cæspitosa glabra scaberula, culmis tenuibus erectis basi ascendentibus sæpissime simplicibus; foliis brevibus linearibus acutis, ligula scariosa truncata; pannicula ut in *A. lachnantha* sed breviore, spiculis vix 2 mm. excedentibus, glumis sterilibus ellipticis mucronulatis carinis hispidulis, gl. fertili quam steriles minore glabra late elliptica, nervis lateralibus in dentes minutos apicales excurrentibus, aristula dorsali minuta, callo breviter barbato, palea elliptica subacuta.

Plants 18 to 30 ft. high; leaves on small basal leaf-shoots short, slender, flaccid, 4 cm. or less in length by 1 mm. or less in breadth, cauline leaves 5 cm. or less by 2 mm. or less. Panicle lanceolate, more or less flexuose, 4·5 to nearly 8 cm. long by less than 1 to 2 cm. broad, branches finely filiform scabridulous fascicled at the nodes, 3 cm. or less in length, generally bare in the lower half. Spikelets greenish, tipped with purple; outer barren glume 2·3 mm. or less, inner slightly shorter (2 mm.); fertile gl. 1·5 mm. with a weak imperfect awn less than ·5 to 1 mm. long; the four lateral nerves all produced into weak apical teeth: pale a little over 1 mm. long. Rhachis not continued above the flower.

Has the habit of a small form of *A. lachnantha* Nees, but is distinguished by the short glabrous flowering glume, which is barely three-quarters the length of the barren glumes.

No. 9596.

Pentaschistis patuliflora Rendle, sp. nov. Annua cæspitosa vaginarum oribus nodisque panniculæ exceptis glabra purpureo-

tincta; foliis tenuibus convolutis rigidulis curvulis; pannicula ovata glanduloso-punctata, ramis sæpius oppositis, interdum solitariis, iterum trichotome ramulosis et effusis, pedicellis spicula sæpius excedentibus; glumis sterilibus basi purpureis superne brunneo-flavescentibus glabris ellipticis acutis, carinis glanduloso-punctatis, glumis fertilibus oblongis 5-nerviis apice bilobulatis, lobulis setiferis, arista quam gluma triplo longiore, palea lineare glumam æquante apice bidenticulata.

Plants 25 to 40 cm. long; culms simple erect springing from a basal tuft of short wiry curving leaves, internodes many, except the flowering completely enveloped by the leaf-sheath. Cauline sheaths 2·5 to 5 cm. long, ligule a short fringe of white hairs less than 1 mm. long, lower blades reaching 12 cm. in length the upper rapidly shortening, ·5 mm. thick. Panicle 5 to 6·5 cm. long, 4·5 to 5·5 cm. broad, lower branches 3 cm., upper gradually shorter, branchlets and pedicels capillary, nodes with a white tuft of hairs. Spikelets 5·5 to 6 mm. long, lower barren glume the length of the spikelet, the upper slightly shorter and narrowing more abruptly at the apex (5 to 5·5 mm. long); fertile gls. 2·5 mm., lateral setæ about 1·5 mm., awn to 8 mm. long, chestnut-brown, kneed at the middle, callus short tufted-hairy; pale narrowing upwards, strongly 2-nerved, anthers 2 mm. long.

Near *P. villosa* (*Danthonia villosa* Nees), but distinguished by its glabrous wiry leaves, effuse panicle, and longer glabrous flowering glumes.

No. 10286.

Urochlæna major Rendle, sp. nov. Annua cæspitosa culmis pluribus simplicibus sæpe geniculatis ascendentibus glabris, nodis fuscis; vaginis quam internodia sæpius duplo minoribus, glabris ore ciliatis, ligula brevi pilosa, lamina anguste lineari-lanceolata pilosa sub apice obtusiusculo scabridula; spicis densis ellipticis compressis inferne in vaginæ auriculis membranaceis inclusis, spiculis subsessilibus paucifloris, compressis; glumis sterilibus æqualibus lateraliter et inæqualiter plicatis, albidis cum nervis 4 viridibus, apice longe acuminato in setam purpuream flexuosam desinente, in margine externo ciliatis, glumis florentibus tribus, infima elliptica glumis sterilibus simili sed 7-nervia et brevius aristata, palea compressa obtusa lateribus inflexis lanceolata.

Plants 4 to 7 in. high, consisting of a tuft of spreading ascending flowering culms, containing when full-grown four elongated internodes 3 to 4·5 cm. long, half or less of which is covered by the closely convolute sheath, and a shorter terminal one (1 cm.) which with the lower third of the spike remains within the spathaceous sheath, the latter is barely 1·5 cm. long, and bears a short lanceolate blade of about the same length. The whole internode with spathe and spike becomes ultimately disjointed. Ligule ·5 mm. long, leaf-blades 4 cm. or less by about 2 mm. greatest breadth. Spike 1·5 cm. long by 1 cm. broad; spikelets greenish, reaching 6 mm. not including awns, with generally three ☿ flowers. Barren glumes 7 mm. to the base of the awn which is 1 cm. long, the edge of the outer broader side scabrid and ciliate, elsewhere

sparsely hairy, the lower triangular-ovate, the upper elliptical. Lowest fertile gl. elliptical when flattened, 9 mm. including the weaker awn (scarcely 3 mm.), hairy at the base and scabrid-ciliate on the upper margin; pale barely 5 mm. long, sparsely pilose especially below the sides, sharply infolded at the strong scabridulous veins; anthers linear pale brown, a good 1·5 mm. long. Second fertile gl. scarcely shorter, incompletely 7-nerved; third fertile gl. 7 mm. long, 5-nerved; uppermost gl. smaller, including only a flower-rudiment.

An interesting addition to a monotypic genus. Distinguished from *U. pusilla* Nees by its larger spike and spikelets, the latter being also fewer-flowered, the larger glumes, and the longer less rigid awns.

No. 8699.

SOME PLANTS OF EAST SCOTLAND.

By Rev. E. S. Marshall, M.A., F.L.S., & W. A. Shoolbred, M.R.C.S.

Nairn was our headquarters last summer, the materials for this paper being collected by one or both of us between July 26th and August 27th. Few things of special interest were obtained, most of the places visited having already been well worked; a part of the district is also exceptionally barren. We are indebted to Messrs. Arthur Bennett, E. G. Baker, H. and J. Groves, Kükenthal, E. F. and W. R. Linton, and W. Moyle Rogers for help with critical forms. The Watsonian vice-counties dealt with are—95, Elgin; 96, E. Inverness with Nairn; 106, E. Ross (one short excursion).

Ranunculus Drouetii Godr. 96. In a little pool not far from the sea, about a mile E. of Nairn; habit quite typical, but carpels almost glabrous.—*R. Baudotii* Godr. 95. A small form is plentiful in Loch Spynie, near Elgin.—*R. scoticus* E. S. Marshall ("*R. petiolaris*"). 96. Stony shore of Loch Alvie, near Aviemore; new to E. Scotland, we believe.—*R. acris* L. var. There occurs sparingly at 3500 ft. in Corrie-an-Lochain, Braeriach—a most disappointing mountain, on its N. side—a peculiar little buttercup with glabrous leaves of an unusual shape and cutting, which Mr. Baker was inclined to name *R. borealis* Trautvetter; it may perhaps be identical with d. *pumilus* Wahlb. of Lond. Cat. ed. 9, which we do not know.

Caltha radicans Forster, var. *zetlandica* Beeby. 96. Stony shore of L. Alvie; certainly inseparable from the cultivated Shetland sheet in Herb. Brit. Mus. In Sowerby's garden specimen of Don's original *C. radicans* the leaf-serrations vary considerably, ranging from acutely dentate to obscurely crenate. We have noticed that in *C. palustris* var. *minor* Syme the prostrate stems are occasionally nodal-rooting.

Berberis vulgaris L. 96. By the Spey, two or three miles below Kingussie; one large bush in fine fruit, probably bird-sown.

Nymphæa pumila Hoffm. 96. Peaty pool among the Spey marshes between Kincraig and Kingussie.

Sisymbrium officinale Scop. var. *leiocarpum* DC. 95. Roadside near Brodie; only seen at one spot.—*S. Sophia* L. 96. Outskirts of Nairn (E. side); doubtfully native.

Teesdalia nudicaulis R. Br. 96. Sandy and shingly ground about Nairn.

Viola ericetorum Schrader. Frequent. 95. Near Forres; Lossiemouth; Garmouth; Dava. 96. Aviemore; Kincraig; Nairn.—*V. lutea* Huds. 95. Dava; scarce. 96. By the river, Kingussie; scarce—the form *amœna* (Symons) in both cases.

Cerastium arvense L. 96. Near Nairn; uncommon.

Stellaria media With. var. *Boræana* (Jord.). 96. Shingly beach, Campbelltown to Fort George.

Sagina apetala L. 96. Nairn; apparently quite rare.—*S. ciliata* Fr. 95. Sandy ground near the sea, Hopeman.—*S. subulata* Presl. 95. Near Forres; coast near Garmouth. 96. Heaths about Nairn.

Buda marina Dum. 95. Salt-marsh near Forres. — *B. media* Dum. 96. Sandy shore, three miles E. of Nairn; a compact form with glandular pedicels.

Malva moschata L. 95. Railway-bank near Forres, towards Dunphail.—*M. rotundifolia* L. 106. Fortrose, on waste ground by the ferry to Fort George.

Radiola linoides Roth. 95. In profusion at Buckie Loch, near Forres; coast near Garmouth. 96. Frequent in damp ground near Nairn.

Geranium pyrenaicum Burm. fil. 96. Naturalized near the Distillery, Nairn. — *G. pusillum* L. 95. Roadside between Elgin and Spynie. 96. Outskirts of Nairn (E. side).

Lupinus perennis L. 96. Established by the Nairn River, but less plentiful here than in most of its Scottish stations.

Trifolium arvense L. 95. Findhorn Bay; Hopeman; near Elgin. 96. In profusion on the beach E. of Nairn. — *T. dubium* Sibth. 95. Garmouth, &c.

Rubus plicatus Wh. & N. A peculiar form, with bright pink flowers (inclining to mauve) and short stamens, which we thought to be best placed under var. *hemistemon*, was sent by Mr. Rogers to Dr. Focke; he replied that the serrature and hairiness of the leaves reminded him of *R. ammobius*, but he considered that it should remain under *plicatus* as a variety, *ammobius* being a step further off. It occurred above the Nairn River (96), two to three miles up, and along a roadside bank near Brodie (95).—*R. Rogersii* Linton. Extraordinarily plentiful in places, almost to the exclusion of the other *Suberecti;* it is sometimes quite a tall strong-growing plant. 95. Alves Junction; Dunphail. 96. Common near Nairn. 106. Frequent in the Black Isle; *e. g.* between Kessock and Arbafeelie, and near Avoch. — *R. villicaulis* Koehl. 95. Garmouth; near Forres; Alves Junction; Dunphail. 96. Nairn environs. 106. Black Isle. — *R. Selmeri* Lindeb. 96. Nairn River; scarce. 106. Black Isle, near Kessock.—*R. danicus* Focke. 95. Dunphail; near Elgin. 96. Common around Nairn. Mr. Rogers also places here two plants gathered by E. S. M. in 1892 at Beauly and near the Falls of Kilmorack. — *R. mucronatus* Blox. var. 106. Dr. Focke

has thus named two gatherings from the Fairy Glen, Rosemarkie (which are by no means the ordinary E. Highland form), as well as one from near Nairn (96). — *R. radula* Weihe. 95. Wood near Forres Station; typical. Near Spynie; more hairy than usual. 106. Fairy Glen, Rosemarkie; typical. — *R. melanoxylon* Muell. & Wirtg. 95. Alves Junction; Garmouth. 96. Common about Nairn. New record for both counties; but this well-marked bramble is evidently frequent near the coast. Mr. Rogers now determines a plant which we found in good quantity in 1893 at Dalmally, v.-c. 98 Argyle, and considered to be very distinct-looking, as this species.

Rosa pimpinellifolia × *tomentosa*. 96. About two miles E. of Nairn. *R. rubiginosa* L. is locally abundant near Nairn, and was seen in several other places.

Peplis Portula L. 95. Buckie Loch; plentiful.

Lythrum Salicaria L. 96. Between Kingussie and Kincraig; very scarce.

Epilobium obscurum Schreb. 95. Cliffs between Lossiemouth and Hopeman; Garmouth; Dunphail. — *E. alsinefolium* Vill. 96. Corrie Sneachda, Cairngorm.

Sium erectum Huds. 95. Plentiful in marshy meadows W. of Loch Spynie.

Anthriscus vulgaris Bernh. 95. Roadside S. of Forres. 96. Close to Nairn (E. side).

Ligusticum scoticum L. 95. Very sparingly on cliffs between Lossiemouth and Hopeman.

Anthemis arvensis L. Fields near Garmouth (95) and Fort George (96), in small quantity.

[*Petasites albus* Gaertn. 95. Brodie; an escape.]

Arctium minus Bernh. 95. Lossiemouth.

Carduus pycnocephalus L. 95. Near Findhorn, indigenous; also on a railway-bank near Alves Junction. 106. Bank near the ferry at Kessock, Black Isle.

Hieracium holosericeum Backh. 94, 96. Grassy places on Cairngorm, in both counties, from 3000 to 3500 ft.; associated with a little *H. eximium* Backh. var. *tenellum* Backh., a good quantity of *H. petiolatum* Elfstrand and *H. chrysanthum* Backh., as well as a fair amount of *H. graniticolum* W. R. Linton, some specimens of which agree well with the description of Babington's "*H. alpinum* var. *insigne*." *H. senescens* Backh. grows sparingly on the Banffshire side, and *H. lingulatum* Backh. in Corrie Sneachda.—*H. saxifragum* Fr. var. *pseudonosmoides* Dahlst. 95. Near Dunphail; about half-a-dozen specimens. — *H. cæsiomurorum* Lindeb. 96. Stream-side above Kingussie. — *H. truncatum* Lindeb. 96. Bushy bank of the Spey, Kingussie, together with *H. Dewari* Bosw. Except that the ligules are mostly abortive, this is practically indistinguishable from Lindeberg's type; just the same stylose form abounds near Roy Bridge, W. Inverness—a characteristic and well-marked species.—*H. strictum* Fr. var. *reticulatum* (Lindeb.). 96. Nairn River.—Var. *amplidentatum* F. J. Hanb. 96. By the Spey, Kingussie, with *H. auratum* Fr.

Taraxacum officinale Web. var. *erythrospermum* (Andrz.). 95. Sandy ground, Lossiemouth.

Sonchus asper L. 95. About Elgin and Forres.

Jasione montana L. 95. Coast near Garmouth; scarce and stunted.

Centunculus minimus L. 96. Damp ground E. of Nairn, in several places.

Erythræa littoralis Fr. 95. Findhorn Bay; often as a dwarf, many-branched state, perhaps due to the central stem being browsed or otherwise injured. 96. Salt-marshes E. of Nairn; locally abundant.

Gentiana campestris L. 96. An extraordinarily branched compact form was found in plenty at intervals on damp, heathy ground between Nairn and Fort George; a very similar, if not identical plant occurs about Aviemore, the flowers being of an unusually dingy and pale lilac hue in both cases. — *G. baltica* Murbeck. 95. Coast near Garmouth; agreeing well with type-specimens. — *G. uliginosa* Willd.? 96. A very slender, annual plant (E. S. M.'s no. 2171) was found abundantly in damp, sandy ground on August 27th, a short mile E. of Nairn (not far from the sea); being taken, both at the time and since, for a peculiar *G. baltica*. In the course of preparing this account, however, we had occasion to examine specimens more closely, and were then immediately struck by their decided resemblance to Willdenow's type, figured in Prof. von Wettstein's *Die europäischen Arten der Gattung Gentiana aus der Section Endotricha* Froel. Further comparison with his description, and with Dr. Murbeck's remarks in his *Studien über Gentianen aus der Gruppe Endotricha*, as well as with *Flora Danica* tab. 328 (which, however, represents a far stronger and more free-flowering form), makes us tolerably confident that this identification is correct. Wettstein says that he has seen British examples from Arbroath, Richmond (Yorks), and Derbyshire. Apparently a late bloomer, as no trace of it was seen when we searched the same ground together, exactly a month before.

[*Symphytum tuberosum* L. 95. Roadside near Brodie Station; not native.]

Myosotis cæspitosa F. Schultz. 95. Frequent; *e. g.* Buckie Loch, Spynie, Garmouth, &c. *M. repens* was noticed by the Spey near Garmouth.

Mimulus Langsdorfii Donn. 95. By the Spey, Garmouth—a small-flowered (cleistogamic) state. 96. Nairn River.

Euphrasia.—The gatherings that we made have been worked out to the best of our ability; unfortunately no report has yet been received from Prof. v. Wettstein, to whom specimens of nearly all were sent. — *E. borealis* Towns. 95. Dava; Brodie; Garmouth. 96. Nairn; Fort George. 106. Arbafeelie.—Var. *pubescens* Towns. 96. A form locally abundant near Lochloy Lodge, about two miles E. of Nairn, is probably this. — *E. brevipila* Burnat & Gremli. Common. 95. About Garmouth; Lossiemouth; Hopeman. 96. Kingussie; Nairn; Fort George; Glenmore Forest, Aviemore, &c. —*E. gracilis* Fr. 95. Abundant on heaths near Dava; a pretty

form with rose-coloured flowers. — *E. scotica* Wettst. 96. Nairn; Aviemore; Kingussie. — *E. curta* Fr. 95. Findhorn Bay. 96. Sandy ground near the sea, a mile E. of Nairn (these two are very like the original plant of Fries, *Herb. Normale*). Glenmore Forest, from 1000 to 1500 ft. — Var. *glabrescens* Wettst. 95. Coast near Garmouth. 96. Plentiful on heathy ground about Aviemore; also near Fort George. — *E. foulaensis* Towns. 94, 96. Cairngorm; abundant in wet grassy ground on the upper part of the mountain, ascending to quite 3500 ft.—a much more hairy plant than Wettstein's description suggests, but just the same as Ben Laoghal specimens so named by him, and having quite the right habit. 95. Grassy ground near Findhorn Bay. — *E. latifolia* Pursh. 96. Only seen in one place, E. of Nairn, where it was plentiful over an acre or two of damp ground near the sea; eglandular, rather less hairy than most of the north coast plants.

Rhinanthus Crista-galli L. var. *fallax* Wimm. & Grab. 95. Spynie, 96. Nairn; near Fort George. — *R. major* Ehrh. var. *aptera* Fr. 95. Garmouth; seen in two stations about three miles apart. 96. Two miles E. of Fort George. All the specimens examined had wingless fruit.

Melampyrum pratense L. var. *hians* Druce. 95. Dava.

Utricularia neglecta Lehm. 95. Barren specimens from shallow water at Buckie Loch appear to be a small state of this; a larger plant is abundant in marshes near Loch Spynie.—*U. Bremii* Heer. 96. The only bladderwort visible on the Moss of Inschoch seems to agree well in habit with the continental plant; a shallow pond just N. of the railway, about a mile distant, was also full of it, but we could not detect a single flower.

[*Mentha alopecuroides* Hull and *M. viridis* L. var. *crispa* Hooker are cottage-garden outcasts at Kingston, 95.] —*M. longifolia* Huds. 95. A peculiar variety of this was found growing beside the Muckle Burn, about two miles W. of Forres, with remarkably cano-floccose pubescence on the under side of the leaves and the inflorescence, the leaves being unusually short and broad, with few teeth. *M. candicans* Crantz has been suggested as a name for it, but Austrian specimens in Herb. Brit. Mus. are quite different; it smelt strongly of cats when bruised.

Lycopus europæus L. 95. Buckie Loch.

Atriplex littoralis L. 96. Coast E. of Nairn; scarce.—*A. patula* L. 95. Findhorn Bay; Lossiemouth; Kingston (maritime forms). — Var. *erecta* (Huds.). 95. Cultivated ground near Forres. — *A. Babingtonii* Woods and *A. laciniata* L. 96. Beach E. of Nairn, the latter in plenty.

Suæda maritima Dum. var. *procumbens* Syme. 95. Findhorn Bay. 96. E. of Nairn.

Rumex conglomeratus Murr. 95. Near Forres. — *R. crispus* × *domesticus* (*R. propinquus* F. Areschoug). 96. By the river about two and a half miles from Nairn, with the parents; endorsed by Mr. Bennett, and agreeing well with the fruit of a Swedish specimen kindly sent by him. *R. crispus* × *obtusifolius* (*R. acutus* L.) grew close by. *R. domesticus* Hartman is not uncommon; we noticed it

about Dunphail, Brodie, Garmouth (95), Nairn and Aviemore (96). — *R. Hydrolapathum* Huds. 95. Marshy ground near Kinloss Church; only a few plants.

[*Euphorbia Esula* L. 95. A fine patch grows on the railway-bank near Loch Spynie.]

Betula verrucosa Ehrh. 95. Woods above the Findhorn, between Dunphail and Forres.—*B. pubescens* Ehrh. var. *parvifolia* (Wimmer). 96. About Aviemore.

Salix purpurea L. 95. A large patch N. of the Culbin Sands, and not far from Buckie Loch; it appeared to be a native.

Orchis latifolia L. 95. Near Hopeman.

Habenaria bifolia R. Br. 96. Heaths E. of Nairn; scarce.

Juncus balticus Willd. 95. Abundant near Findhorn Bay (with *J. maritimus* Lam.) and near Garmouth. 96. E. of Nairn.

Luzula erecta Desv. 95. About Brodie and Garmouth.

Typha latifolia L. 95. Buckie Loch; Loch Spynie. 96. Moss of Inschoch. Native.

Sparganium ramosum Huds. var. *microcarpum* Neum. 95. Kinloss; Spynie. 96. Kingussie; near Nairn. The only form seen. — *S. simplex* Huds. 95. Garmouth. 96. Aviemore; Nairn. — *S. affine* Schnizl. 95. Moorland pool between Dava Station and Lochan Dorb, at about 1000 ft.; a form with small female heads and subsolitary male heads, which agrees well with a plant found by us in a tarn on one of the Glen Spean mountains in 1896, and since determined by Pastor L. M. Neuman as his var. *microcephalum*.

Potamogeton prælongus Wulf. 96. Loch Loy, near Nairn; associated with *P. heterophyllus* and *P. perfoliatus*. — *P. obtusifolius* Mert. & Koch. 96. Pool adjoining the Spey, two or three miles below Kingussie.—*P. filiformis* Nolte. 96. Pool E. of Nairn, with *Ranunculus Drouetii*.

Eleocharis uniglumis Reichb. 95. Findhorn Bay; Spynie. 96. Nairn.

Scirpus Tabernæmontani Gmel. 95. Garmouth; Spynie; near Kinloss Church; Buckie Loch. 96. About four miles E. of Nairn. Locally plentiful.

Carex incurva Lightf. 96. Sandy coast, a mile E. of Nairn.— — *C. curta* Good. 95. Spynie; Buckie Loch. 96. Spey marshes below Kingussie. — *C. aquatilis* Wahlenb. 95. Pool near the Spey mouth, Garmouth. 96. In enormous quantity and very variable below Kingussie. Pfarrer Kükenthal names specimens from both counties, well representing what we have been accustomed to call var. *elatior* Bab. (or *Watsoni* Syme), as "*C. aquatilis* typica; quite corresponds with the Scandinavian specimens." If a varietal name is retained, it follows that the mountain form (*minor* Boott) should preferably be distinguished. — *C. panicea* L. var. *tumidula* Laest. 96. Spey marshes between Kingussie and Kincraig; rather more luxuriant than the specimens of Fries, *Herb. Normale*, but otherwise an excellent match.—*C. vaginata* Tausch. 94. Cairngorm, in Banff as well as in Inverness; ascending to 3500 ft. — *C. extensa* Good. var. *pumila* Anderss. Muddy coast four miles E. of Nairn.—

C. flava L. var. *lepidocarpa* (Tausch.). 96. Near Nairn.—*C. Oederi* Retz. 95. Buckie Loch, in profusion; also in a dried-up pond near the sea, N.W. of Garmouth, 96. Near Nairn (type and var. *cyperoides* Marsson); Loch Alvie, near Aviemore: here it hybridizes with *C. Hornschuchiana* Hoppe, but much less frequently than var. *œdocarpa* Anderss. = *C. flava* var. *minor* Towns.; the latter hybrid was also seen near Kingussie. — *C. rostrata* Stokes, var. *brunnescens* Anderss. 96. By the Spey below Kingussie; fruit brownish, beak short. *C. vesicaria* is common in these marshes.

Deschampsia alpina R. & S. 94. Cairngorm, at about 3500 ft.—*D. discolor* R. & S. 96. Wet heaths E. of Nairn.

Avena strigosa Schreb. Remarkably plentiful as a weed in oat-fields, and occasionally among other crops. 95. Brodie; Forres; Garmouth; Elgin. 96. Nairn, &c.

Catabrosa aquatica Beauv. A dwarf, prostrate form was noticed near Lossiemouth; the var. *littoralis* Parn., or very near it.

Festuca arundinacea Schreb. 95. Garmouth; Spynie. 96. By the river at Nairn.

Agropyron junceum Beauv. 95. Lossiemouth; Findhorn. 96. Nairn.

Elymus arenarius L. 95. Abundant near Lossiemouth. 96. Nairn.

Asplenium marinum L. 95. Sparingly on rocks between Lossiemouth and Hopeman, where *A. Adiantum-nigrum* L. also occurs.

Lastræa æmula Brackenbridge. 96. Corrie-an-Lochan, Braeriach, just above the tarn, at 3300 ft.

A NEW BRITISH RUBUS.

By J. Walter White, F.L.S.

Rubus Bucknalli, n. sp. R. caule arcuato-prostrato obtuse-angulato dense piloso-sericeo, aculeis multis tenuibus subæqualibus patentibus vel declinatis, foliis pedato-quinatis, foliolis irregulariter dentato-serratis imbricatis supra opacis pilosis subtus pallidioribus pilosis, foliolo terminali rotundo-cordato acuminato vel cuspidato infimis subsessilibus intermediis incumbentibus, paniculæ elongatæ angustæ foliosæ hirtæ ad apicem dense obtusæ ramis axillaribus ascendentibus distantibus aculeis parvis crebris declinatis, sepalis ovato-attenuatis setosis a fructu laxe reflexis, corolla alba.

Stem arcuate-prostrate, bluntly angular, slightly furrowed, greyish, densely hairy with curved and wavy silky hairs, the surface when young bearing a good deal of resinous or glandular exudation. Prickles many, scattered, subequal, straight, slender, patent or declining. Leaves quinate-pedate. Leaflets thick, dull green, hairy on both surfaces, sharply dentate- or lobate-serrate, broad, all more or less imbricate and cordate at the base; terminal leaflet broadly cordate or cordate-ovate, acuminate; petioles and midribs armed with hooked or declining prickles, and bearing some

minute sessile glands. Stipules linear, hairy, setose. Panicle long, narrow, leafy, with close blunt top and distant ascending axillary branches shorter than their leaves. Leaves quinate or ternate, resembling those of the stem, but with shorter points. Rachis and pedicels well armed with many slender prickles, densely hairy, with some scattered stalked glands on the upper portions. Sepals ovate-attenuate, glandular, reflexed after flowering. Petals broad, oval, contiguous, white. Filaments white, exceeding the green styles.

The place of this plant is between *R. corylifolius* and *R. Balfourianus*. Dr. Focke, to whom specimens were sent by Mr. Rogers, was inclined to put it under the latter, from which, however, it appears to be amply distinguished by the angular, densely hairy and more prickly stem, devoid of acicles and stalked glands, and by the long, narrow, close-topped panicle, and white corolla. It grows abundantly over a large area in open glades and on the skirts of aboriginal woodland at an elevation of over 600 ft. on oolitic hills between North Nibley and Wotton-under-Edge, West Gloucestershire.

The name is given in honour of Cedric Bucknall, Mus. Bac. Oxon, who discovered this bramble together with *Stachys alpina* in the same locality.

BIBLIOGRAPHICAL NOTES.

XX.—Curtis's 'Flora Londinensis.'

Already in this Journal (1881, p. 309, and 1895, p. 112) some notes have appeared as to the order in which the plates of this great work were originally issued, but no complete list of the plates has been printed. It has been suggested that this would be interesting. In compiling the following list I have been chiefly aided by the references contained in the second edition of Withering's *Botanical Arrangement of British Plants*, in which Curtis's plates are referred to by the parts or "Nos." (as they were called) containing them as originally published, each "No." containing six plates. Thus each of the six plates in the first "No." of the first Fasciculus is referred to in Withering as "Curt. I. 1." The order of the plates *in each No.* cannot, as far as I am aware, be ascertained until we get to Plate 101, from which up to 348 the plates themselves are numbered, but with some considerable irregularities (several plates have the same numbers, and some numbers are omitted). After 348 (including the whole of Fasc. vi.) the plates again are not numbered, and the dates of only a few of them can be ascertained. Further interesting particulars will be found in the "Notes" above referred to.

Fasciculus I.

No. 1:—*Anagallis arvensis* ("tab. 1," Sibthorp, Fl. Oxon.), *Butomus umbellatus*, *Hypericum pulchrum*, *Solanum Dulcamara*, *Lonicera Periclimenum*, *Asplenium Scolopendrium*. According to

Pulteney, this "No." was published in May, 1775 (see Journ. Bot. 1881, p. 310, and 1895, p. 113).

No. 2:—*Draba verna*, *Lychnis Flos-cuculi*, *Hypericum perforatum*, *Polygonum Bistorta*, *Poa annua*, *Hypnum proliferum*.

No. 3:—*Cerastium aquaticum* (*Stellaria*), *Scandix Anthriscus*, *Bellis perennis*, *Leontodon Taraxacum*, *Ophrys apifera*, *Bromus mollis*.

No. 4:—*Ranunculus acris*, *Orobus tuberosus*, *Sedum acre*, *Hottonia palustris*, *Veronica Chamædrys*, *Bromus sterilis*.

No. 5:—*Erigeron acris*, *Potentilla reptans*, *Antirrhinum Linaria*, *Veronica serpyllifolia*, *Verbena officinalis*, *Polygonum Persicaria*.

No. 6:—*Viola tricolor*, *Æthusa Cynapium*, *Convolvulus Sepium*, *Euphorbia Peplus*, *Festuca fluitans* (*Glyceria*), *Bryum undulatum* (*Mnium*).

No. 7:—*Ranunculus bulbosus*, *Conium maculatum*, *Antirrhinum Elatine* (*Linaria*), *Veronica agrestis* (*polita*), *Bryum scoparium* (*Dicranum*), *Ervum tetraspermum* (*Vicia*).

No. 8:—*Ervum hirsutum* (*Vicia*), *Caltha palustris* (contains a reference to "last spring 1775"), *Hedera Helix*, *Senecio vulgaris*, *Lamium purpureum*, *Bryum hornum* (*Mnium*).

No. 9:—*Capsella Bursa-Pastoris*, *Viola odorata*, *Geranium Cicutarium* (*Erodium*), *Saxifraga granulata*, *Dipsacus pilosus*, *Anthoxanthum odoratum*.

No. 10:—*Geranium Robertianum*, *Lapsana communis*, *Antirrhinum Cymbalaria* (*Linaria*), *Viola hirta*, *Polygonum aviculare*, *Aira aquatica* (*Catabrosa*).

No. 11:—*Digitalis purpurea*, *Sedum album*, *Euphrasia Odontites* (*Bartsia*), *Thymus Acinos* (*Calamintha*), *Polygonum Hydropiper*, *P. minus*.

No. 12:—*Alsine media* (*Stellaria*), *Erica Tetralix*, *Euphorbia Helioscopia*, *Polygonum Pensylvanicum* (*lapathifolium*), ditto, var. *caule maculato* (*maculatum*), *Polypodium vulgare*.

End of Fasc. I. Date not later than July, 1777 (see preface and pp. 1149-51 of Lightfoot's Fl. Scotica).

Fasciculus II.

No. 13:—*Anemone nemorosa*, *Ranunculus Ficaria*, *Arabis Thaliana*, *Tussilago Farfara*, *Erica cinerea*, *Thymus Serpyllum*.

No. 14:—*Lychnis dioica*, *Cerastium viscosum* (*glomeratum*), *Stellaria Holostea*, *Mercurialis perennis*, *Poa pratensis*, *Agaricus fimetarius*.

No. 15:—*Ranunculus hirsutus*, *Malva sylvestris*, *Poterium Sanguisorba*, *Veronica Beccabunga*, *Plantago lanceolata*, *Poa trivialis*.

No. 16:—*Ranunculus auricomus*, *Trifolium fragiferum*, *Solanum nigrum*, *Plantago major* (Lightfoot's *Flora Scotica*, 1777, first quoted), *Chenopodium album*, *Ajuga reptans*.

No. 17:—*Ranunculus sceleratus*, *Saponaria officinalis*, *Galium Aparine*, *Alopecurus myosuroides*, 101 *Agaricus ovatus* (the first numbered plate), 102 *Polytrichum subrotundum* (*Pogonatum nanum*).

No. 18:—103 *Chenopodium viride*, 104 *Rumex crispus*, 105 *Bromus hirsutus*, 106 *Epilobium angustifolium*, 107 *Lotus corniculatus*, [108] *Viola canina* (*sylvatica*).

No. 19:—109 *Lamium amplexicaule*, 110 *Veronica hederæfolia*,

111 *Oxalis Acetosella*, 112 *Fumaria officinalis*, 113 *Geum urbanum*, 114 *Arum maculatum*.

No. 20:—115 *Lamium album* (Huds. Fl. Angl. ed. 2 (1778), first quoted), 116 *Chenopodium polyspermum*, 117 *Epilobium hirsutum*, 118 *Atriplex hastata*, 119 *Convolvulus arvensis*, 120 *Medicago lupulina*.

No. 21:—121 *Orchis mascula*, 122 *Cerastium semidecandrum*, 123 *Sonchus oleraceus*, 124 *Trifolium ornithopodioides* (*Trigonella*), 125 *Epilobium villosum* (*parviflorum*), 126 *Hypnum sericeum*.

No. 22:—127 *Osmunda Spicant* (*Blechnum*), 128 *Trifolium subterraneum*, 129 *Saxifraga tridactylites*, 130 *Cerastium vulgatum* (*triviale*), 131 *Epilobium tetragonum*, 132 *Bryum viridulum* and *truncatulum*.

No. 23:—133 *Veronica arvensis*, 134 *Tussilago Petasites*, 135 *Adonis autumnalis*, 136 *Sagina erecta* (*Mœnchia*), 137 *Adoxa Moschatellina*, 138 *Chrysosplenium oppositifolium*.

No. 24:—139 *Hyacinthus non-scriptus*, 140 *Juncus campestris* (*Luzula*), 141 *Geranium molle*, 142 *Poa rigida*, 143 *Glechoma hederacea*, 144 *Erysimum Alliaria*.

Fasciculus III.

No. 25:—145 *Hypochœris glabra*, 146 *Aira præcox*, 147 *Sedum dasyphyllum*, 148 *Carduus Marianus*, 149 *Lysimachia Nummularia*, 150 *Picris echioides*.

No. 26:—151 *Linum catharticum*, 152 *Hypochœris radicata*, 153 *Sisymbrium sylvestre*, 154 *Betonica officinalis*, 155 *Scutellaria galericulata*, 156 *Inula pulicaria*.

No. 27:—157 *Malva rotundifolia*, 158 *Sagina procumbens*, *158* (sic) *Brassica muralis* (*Diplotaxis tenuifolia*), 159 *Geranium pyrenaicum*, 160 *Sempervivum tectorum*, 161 *Trifolium agrarium* (*procumbens*).

No. 28:—162 *Hypericum humifusum*, 163 *Rumex maritimus*, 164 *Inula dysenterica*, 165 *Myosotis scorpioides* (*palustris*), 166 *Bryum cæspiticium* and *argenteum*, 167 *Hydrocharis Morsus-Ranæ*.

No. 29:—168 *Rumex obtusifolius*, 169 *Typha minor* (*angustifolia*), 170 *Lathyrus pratensis*, 171 *Typha major*, 172 *Vinca minor*, 173 *Fragaria sterilis*.

No. 30:—174 *Orchis Morio*, 175 *Cardamine pratensis*, 176 *Medicago arabica*, 177 *Ophrys ovata* (*Listera*), *158* (sic) *Cardamine amara*, *180* (sic) *Carex pendula*.

No. 31:—181 *Rumex acutus* (*sanguineus*), 182 *Hypericum hirsutum*, 183 *Stachys sylvatica*, 184 *Chenopodium Bonus-Henricus*, 185 *Centunculus minimus*, 186 *Lythrum Salicaria*.

No. 32:—187 *Anagallis tenella*, 188 *Montia fontana*, 189 *Scabiosa succisa*, 190 *Hydnum auriscalpium* (date, after Oct. 1780; see letterpress), 191 *Avena elatior* (*Arrhenatherum*), 192 *Bidens cernua*.

No. 33:—193 *Trifolium repens*, 194 *Agaricus glutinosus*, 195 *Epilobium montanum*, 196 *Phallus impudicus*, 197 *Iris Pseudacorus*, 198 *Veronica officinalis*.

No. 34:—200 *Agaricus plicatilis*, 201 *Lycopus europæus*, 202 *Dipsacus sylvestris*, 203 *Potentilla anserina*, 204 *Circæa lutetiana*, *207* (sic) *Hypnum purum*.

No. 35:—205 *Antirrhinum spurium* (*Elatine*), 206 *Hypericum Androsæmum*, 208 *Stachys palustris*, 209 *Agrostemma Githago*, 210 *Sedum Telephium* (211 in next Fasc.), 212 *Avena flavescens*.

No. 36:—213 *Sambucus Ebulus*, 214 *Bryum subulatum* (*Tortula*), 215 *Papaver Rhœas*, 216 *Agaricus ostreatus*, 217 *Viola palustris*, 218 *Fritillaria Meleagris*.

Fasciculus IV.

No. 37:—219 *Eriophorum vaginatum*, 220 *Veronica montana*, 221 *Eriophorum polystachion*, 222 *Vinca major* ("223" comes in 40 and in 42!), 224 *Boletus lucidus*, 225 *Sedum sexangulare*.

No. 38:—226 *Campanula rotundifolia*, 227 *Trifolium glomeratum*, 228 *Holcus lanatus*, 229 *Prunella vulgaris*, 230 *Symphytum officinale*, 231 *Hypericum quadrangulum*.

No. 39:—232 *Orobanche major*, 233 *Parietaria officinale*, 234 *Antirrhinum Orontium*, 235 *Phallus caninus* (date, end of 1781; see letterpress), [236] *Agaricus procerus*, *211* (sic) *Ranunculus repens*.

No. 40:—*223* (sic) *Polygonum amphibium*, 237 *Bidens tripartita*, 238 *Arctium Lappa*, *139* (sic) *Spergula saginoides*, 240 *Menyanthes trifoliata*, *Agaricus velutipes* (not numbered, but "iv. 40" in With.).

No. 41:—*Cichorium Intybus*, 242 *Panicum sanguinale*, 244 *P. Crus-galli*, 244 *Clematis Vitalba*, 245 *Euphorbia exigua*, *245* (sic *Jasione montana*.

No. 42:—*223* (sic) *Galeobdolon Galeopsis*, *228* (sic) *Malva moschata*, 246 *Stachys arvensis*, 247 *Chironia Centaurium* (*Erythræa*), 247 (sic) *Ranunculus hederaceus*, 248 *Chenopodium hybridum*.

No. 43:—*248* (sic) *Milium effusum*, 249 *Asperula odorata*, *249* (sic) *Cynoglossum officinale*, 250 *Geranium pratense*, 251 *Myosurus minimus*, 252 *Plantago media*.

No. 44:—253 *Turritis glabra*, 260 (254–9 omitted, making *260 right*), *Panicum verticillatum*, 261 *Spergula nodosa*, 262 *Panicum viride* (*Setaria*), 263 *Polygonum Convolvulus*, 264 *Agaricus floccosus*.

No. 45:—265 *Sonchus arvensis*, 266 *Silene anglica*, 267 *Raphanus Raphanistrum*, 268 *Arenaria serpyllifolia*, *268* (sic) *Samolus Valerandi*, 271 *Jungermannia complanata*.

No. 46:—270 *Ophrys spiralis* (*Spiranthes*), 272 *Arenaria trinervia*, 273 *Bunium Bulbocastanum* (*flexuosum*), 273 *Chærophyllum sylvestre*, 274 *Bryum barbatum* (*Tortula unguiculata*), 275 *Phascum subulatum* and 276 *P. acaulon* (one plate).

No. 47:—277 *Cardamine hirsuta* (*sylvatica*), 278 *Valeriana dioica*, 279 *Hieracium Pilosella*, 280 *Carex acuta* (*paludosa*), 281 *C. riparia*, 282 *C. gracilis* (*acuta*).

No. 48:—283 *Scutellaria minor*, 284 *Scirpus maritimus*, 285 *Equisetum arvense*, 286 (misnumbered *288*) *Peplis Portula*, 287 *Hippuris vulgaris*, 288 *Scabiosa arvensis*.

Fasciculus V. (probably commenced in 1783, and ended in or about 1788).

No. 49:—*288* (sic) *Lysimachia vulgaris*, 289 *Sisymbrium terrestre* (*Nasturtium palustre*), 291 *Sagina apetala*, 291 *Scrophularia aquatica*, [294] *Cistus Helianthemum*, [29]5 *Potamogeton crispus*.

No. 50:—294 *Senecio erucæfolius*, *295 Teucrium Scorodonia*, 296 *Alopecurus pratensis*, *296* (sic) *Antirrhinum minus* (*Linaria*), 297 *Erica vulgaris*, *297* (sic) *Papaver dubium*.

No. 51:—298 *Sonchus palustris*, 299 *Rosa canina* (*dumalis*), 300 *Ligustrum vulgare*, 301 *Melica uniflora*, 302 *Convallaria majalis*, 303 *Thlaspi campestre* (*Lepidium*).

No. 52:—*307* (sic) *Spergula arvensis*, *307* (sic) *Trifolium procumbens* (*minus*), 308 *Agaricus aurantius*, 309 *A. æruginosus*, 310 *Vicia Cracca*, 311 *Sisymbrium Irio*.

No. 53:—312 *Agaricus verrucosus*, 313 *Papaver Argemone*, 314 *Leontodon hispidum*, 315 *Sherardia arvensis*, *315* (sic) *Agaricus carnosus*, 316 *Linum usitatissimum*.

No. 54:—317 *Agrimonia Eupatoria*, 318 *Alisma Plantago*, 319 *Valeriana Locusta*, 320 *Rhinanthus Crista-galli*, 321 *Sinapis arvensis*, 322 *S. alba*.

No. 55:—323 *Holcus mollis*, *249* (sic) *Scandix Pecten*, 325 *Hordeum murinum*, 326 *Erysimum officinale*, 327 *Crepis tectorum* (*virens*), 328 *Lysimachia nemorum*.

No. 56:—329 *Anthemis Cotula*, 330 *Poa aquatica*, 331 *Matricaria Chamomilla*, 332 *Veronica Anagallis*, 333 *V. scutellata*, 334 *Onopordon Acanthium*.

No. 57:—335 *Euphrasia officinalis*, 336 *Lycopsis arvensis*, *336* (sic) *Mercurialis annua*, 337 *Tormentilla officinalis*, 338 *Origanum vulgare*, 339 *Alopecurus geniculatus*.

No. 58 (last No. quoted in With. ed. 2 (1787)):—340 *Spiræa Ulmaria*, 341 *Sparganium simplex*, 342 *S. ramosum*, 343 *Achillea Ptarmica*, 344 *Bromus giganteus*, *334* (sic) *Juncus sylvaticus* (*Luzula*).

No. 59:—345 *Juncus pilosus* (*Luzula*), 347 *Atropa Belladonna*, 348 *Chrysanthemum Leucanthemum*, *Alisma Damasonium*,* *Orchis latifolia*, *Prenanthes muralis*.

No. 60:—*Lathyrus Aphaca*, *Leucojum æstivum*, *Melica cærulea* (*Molinia*), *Spartium Scoparium*, *Chenopodium olidum*, *Rumex Acetosella*.

Fasciculus VI. (which apparently did not commence till 1790 or 1791) contains seventy-two additional plates (not numbered); but a few of them are dated, and the approximate dates of others may be inferred as follows:—

Lathyrus sylvestris, *Ornithopus perpusillus*, *Urtica dioica*, and *U. urens* have date "Jan. 1. 1791" on plate. *Geranium dissectum* has "Mar. 1. 1791." *Ranunculus Flammula* has a reference to "last July 1791." *Festuca elatior* and *F. loliacea* have "Dec. 1. 1791" on plate. *Ophrys fucifera* (*aranifera*) was published on "June 1, 1794" (see letterpress); *Antirrhinum Peloria* also in the same year.

There are references to the following in Sibthorp's Fl. Oxon. (1794), viz.:—*Achillea Millefolium*, *Aira caryophyllea*, *Carduus polyacanthos*, *C. tenuiflorus*, *C. palustris*, *C. arvensis*, *Caucalis Anthriscus*, *C. infesta*, *Cerastium arvense*, *Chenopodium murale*, *Chærophyllum*

* This and the eight following may have been published in a different order.

temulum, *Chrysanthemum segetum*, *Festuca pratensis*, *Galium verum*, *Geranium parviflorum*, *Hieracium umbellatum*, *Hydrocotyle vulgaris*, *Leontodon hirtum*, *Melissa Nepeta*, *Primula officinalis*, *P. acaulis*, *Salix monandra* (*purpurea*), *S. triandra*, *Sisymbrium Nasturtium*, *Stellaria uliginosa*, *Thlaspi arvense*, *Trifolium arvense*, and *Valeriana officinalis*.

Withering, in Bot. Arr. ed. 3 (1796), also refers to the following:—*Anemone Apennina*, *Carex ventricosa*, *Centaurea Cyanus*, *Cerastium pumilum*, *Helleborus viridis*, *Iberis nudicaulis* (*Teesdalia*), *Melittis Melissophyllum*, *Poa procumbens* (Withering's "*rupestris*"), *Ranunculus arvensis*, *Saxifraga oppositifolia*, *Scilla autumnalis*, *Trifolium ochroleucum*, and *Veronica triphyllos*.

This leaves the following to be accounted for, apparently published in the years 1796, 7, or 8, viz.:—*Agrostis setacea*, *Bromus diandrus*, *Cerastium tetrandrum*, *Chenopodium rubrum*, *Cistus guttatus*, *Datura*, *Fumaria capreolata*, *Galeopsis versicolor*, *Glaucium corniculatum*, *Lathyrus Nissolia*, *Lobelia urens* (under which Curtis refers to "October 18. 1796" as "two years since"), *Melica nutans*, *Ophrys anthropophora*, *Orchis fusca* (*purpurea*), *O. bifolia*, *Poa retroflexa*, *Primula farinosa*, *Pulmonaria maritima*, *Salvia Verbenaca*, *Saxifraga Hirculus*, and *Trifolium scabrum*.

Mr. Daydon Jackson (Journ. Bot. 1881, 309) refers to "a full list" of these plates having been drawn up by the late Mr. Pryor. This I have not seen, though I have benefited by the hints contained in Mr. Jackson's paper.

W. A. Clarke.

SHORT NOTES.

Sempervivum hierrense, sp. nov.—S. caule erecto, simplici; foliis anguste spathulatis glabris, submucronatis, serrato-ciliatis; floribus carnosis in thyrsum latum digestis; ramulis puberulis; calycis puberuli dentibus lineari-triangularibus; squamis perigynis conspicuis.

Hab. In ins. Ferroensi Canariensium.

When describing *S. percarneum* (p. 201), I stated that there existed at Kew a specimen of that species from the island of Hierro, adding, "it agrees exactly with Canarian specimens." Since then I have visited Hierro, and examined living plants. In consequence I find myself compelled to withdraw what I had written. The plants of Grand Canary and Hierro turn out to be quite distinct, although indistinguishable in the dried state without careful dissection, which I had not the opportunity of making. The differences may be thus stated:—

S. percarneum: fruticose, much branched. Perigynous scales *none*.

S. hierrense: unbranched, at least normally: apparently once flowering; scales conspicuous, quadrate.

I find the petals in *S. hierrense* pale flesh-coloured, with green medial stripe. It grows somewhat sparingly on rocks and walls at

Valverde and on rocks at "el Golfo" (*H. de la Perraudière*). Unfortunately the plants which I had procured for cultivation were destroyed, the friend to whose care I had committed them having kept them for six weeks in a bucket of water! Another plant which I have lately seen in one of its original stations is *S. strepsicladum* H. Chr. I am more than ever convinced that it cannot be separated from *S. barbatum*.—R. P. Murray.

Hampshire Plants. — During a recent visit to the New Forest, I came across *Polypodium Phegopteris* growing most luxuriantly in boggy ground shaded by bushes. The patch extended for about two hundred yards, and the only other ferns near were *Lastræa dilatata* and *L. spinulosa*. I believe it is not previously recorded as a Hampshire plant. Near Fawley I found *Brassica Cheiranthus* growing along a hedgebank on the moorland for several hundred yards, probably nearly a furlong, in some abundance, but more than four miles from the sea. A specimen collected in the same locality in June, 1883, by Messrs. H. & J. Groves is in the British herbarium of the Pharmaceutical Society.—E. M. Holmes.

Criticisms of the 'Cybele Hibernica,' ed. 2.—Mr. Marshall contends that too many plants were treated as suspects, and that other suspected plants have been dealt with too rigorously. I should scarcely have offered any remarks on the subject, but that I do not wish to be included amongst those who support his contention. This disclaimer does not commit one to approval of the views taken by Mr. More and the editors in each and every case. There are cases in which, if I or anyone else were called on to decide, the verdict would differ in some degree from that of the *Cybele*. The scepticism of the *Cybele* is, however, preferable to the hasty conclusion that, because a plant is found growing "wild," therefore it must be native. As regards many members of our flora, there is no question more difficult than that of status. This was so much felt in the preparation of the *Flora of North-east Ireland* that it was decided not to adopt the dagger or asterisk as used by other authors, but to include in an appendix such as were certainly introduced either accidentally or intentionally in our district. For the rest the facts were stated, and readers were left to form their own judgments. Increasing experience warns one that plants may appear spontaneously in such circumstances that we can scarcely conjecture the means by which they come. A local puzzle of this kind is afforded by *Hieracium Auricula* on the Cave Hill, near Belfast. I have known it there for three years: it is not spreading. It is an unattractive plant, not to be found in gardens, nor likely to have come with seed, and there are neither gardens nor cultivation for some considerable distance. Most probably it will die out in a few years, but, if not, some one may claim it as a native. Mr. Marshall refers to *Helianthemum vulgare*, and enquires if there is a well-attested case of it being planted out anywhere. No doubt, in Antrim. Glendarragh is not in a limestone district: no rock rose can be found there now, and if it ever grew there outside a rockery it must have been planted, as many other native and non-native plants were, to

enrich the flora of Lough Neagh shores. The rock roses are not so undesirable as Mr. Marshall seems to think; I myself have been requested, when going west, to bring back roots for cultivation. As for *Sedum album* and *S. dasyphyllum*, they have, so far as the north of Ireland is concerned, no claim whatever to be accounted native. The "amiable lunatic" who plants rare or exotic species is not at all scarce. On the contrary, one has a continual struggle to prevent the enrichment of our flora by the introduction of plants which this or that individual thinks to be desirable additions. Several of these have been introduced about Belfast. *Hottonia*, brought from Downpatrick, flourishes in our bog meadows; *Limnanthemum* and *Acorus* in the Lagan Canal. These are as firmly established and look as native as could be desired.—S. A. Stewart.

NOTICES OF BOOKS.

Californian Hypogæous Fungi. Proceedings of the California Academy of Sciences. 3rd Ser. Botany. Vol. I., No. 8. San Francisco. 1899.

This is one of the series of valuable mycological papers we are now accustomed to receive from our friends in North America, and we have no hesitation in saying that it is one of the best and most interesting we have welcomed for a long time. Examples of subterranean fungi are always more or less difficult to procure, and the habitats and surroundings pertaining to California are so very different from the positions peculiar to Europe that any piece of earnest work is bound to be fruitful in good results. For the first time, as far as we are aware, we have in these fifty pages and four large folding plates, filled with beautifully drawn and coloured illustrations, a clear insight into the Hypogæi of North America. For comparison with the allied plants found in Europe as described by Tulasne, Vittadini, and others, the work before us is of high value.

The essay contains descriptions and illustrations of the underground fungi belonging to both the Basidiomycetes and Ascomycetes, and is remarkable for the number of apparently sound new genera and species found under these families. We say "apparently sound," for at the present time, more than ever before, biologists differ greatly in their estimates of the value of generic and specific characters. In fact, it would seem to be the conclusion now arrived at that few natural forms have entire permanence either in the animal or vegetable kingdom.

For the sake of comparison with the British Flora we may say that, whilst we have only twelve species of *Hymenogaster* in Britain, nineteen are here recorded from California, seven of which are new. We have two species of *Hydnangium*, whilst three, and all new, have been detected in California. Of *Octaviana* we have only three to the nine of California, five of the latter new. To Berkeley's two British species of *Hysterangium* nine are recorded from California, four being new; and in like manner additions are made to other

familiar genera. But not only is there an abundance of new species, but new genera, as *Leucophleps* with five species, *Myrmecocystis* with two species, and a monospecific genus named *Terfeziopsis*, are described. Of special interest, too, is the well-illustrated parasitic genus named *Sporophaga* (*Ustilago* Ces.). The single species, *S. cydnea*, grows within the ascus and spores of *Balsamia vulgaris* Vitt., one of the seven species of *Balsamia* detected in California. Of this genus we have only one species in this country, *B. platyspora* Berk., which, however, occurs too in California. In all, one hundred and eight plants are described, including the parasitic; the novelties being clearly, fully, and beautifully illustrated in color.

The five pages of introduction are very interesting and instructive; here the author mentions his ill-health, the long and persistent efforts necessary for the production of the work before us, and his use of a garden hoe as the best implement for raking subterranean species of fungi to the surface. "Experience," says Mr. Harkness, "teaches the collector to seek such localities as are best suited to the growth and development of the desired material." The results which follow long experience are indeed sometimes wonderful. For many successive years we accompanied the late C. Edmund Broome on mycological excursions; this gentleman, when searching for Hypogæi, invariably carried a short-handled rake, a sharp trowel, and a strong, sharp clasp-knife. He everywhere noted carefully the character of the soil and trees, the open places in woods, and the grassy places under trees. He would suddenly stop whilst walking, and point in a certain direction and say—"You will probably find so-and-so there if you rake," and forthwith Mr. Broome would go on to his knees (he usually wore leather leggings) and vigorously rake up the surface of the ground. He was usually successful, though some of the smaller species were difficult enough to see in the disturbed earth. I well remember passing the lawn belonging to a large house on one of these excursions; the windows of the house were near and overlooked us, and some abele trees were growing near the edges of the lawn. The attraction of this position was irresistible to Mr. Broome—the case of Odysseus and the Sirens was nothing to it: I could not have held Broome back or bound him to an abele trunk. He crept on his hands and knees through the boundary hedge, carefully cut up and removed the turf with his sharp trowel, and then raked up the earth and secured his game. He had no time to replace the turfs, but crept back to me victoriously smiling at the place where I had been stationed to keep watch for him. I once asked Mr. Broome what made him first take up with the study of subterranean fungi. He replied that when he was a young man he accidentally noticed a strange vegetable growth sticking out of the earth in the side of a ditch. He cut it away, not knowing in the least what it was, when some friend who had heard of the name of Berkeley as a botanist told Broome to send the marvel on to him. Broome did so, and Berkeley at once replied that the growth was "one of the Tuberacei—*Choiromyces meandriformis* by name"—a sufficiently formidable answer to one not yet a beginner. Berkeley also advised Broome to look for other plants of

a like class, with a result now known to all mycologists. This was the beginning of the life-long friendship of Berkeley and Broome. Berkeley's fungi rest at Kew, Broome's at the British Museum.

Returning to Mr. Harkness's Introduction, we there find his experience of methods of quest, of seasons, localities, conditions, destroyers, &c. In California there are dense forests of Sequoias, tracts of *Eucalyptus*, *Pinus contorta*, &c., all quite different from what we get in Europe, and therefore the very places most likely to produce new genera and species. The author says that the Californian species of *Tuber* (the genus to which the chief English, French, and Italian truffles belong) are all edible, although none of the European species appear there. In conclusion, we look upon this work on the Hypogæous Fungi of California as a clear and distinct addition to useful knowledge; by no means a compilation, but an essay descriptive and illustrative of a large number of new vegetable forms brought to light by experience, the use of the hoe, and botanical knowledge.

W. G. S.

Royal Gardens, Kew. Bulletin of Miscellaneous Information. No. 144, "December, 1898"; Stationery Office date, "12/98," issued August, 1899; pp. 30: Nos. 145, 146, "January and February, 1899"; Stationery Office date, "7/99"; issued July; pp. 24: Nos. 147, 148, "March and April, 1899"; Stationery Office date, "7/99"; issued August; pp. 32: Nos. 149, 150, "May and June, 1899"; Stationery Office date, "7/99"; issued August; pp. 32.

After a suspension of nine months, our erratic little Kew contemporary has once more sprung into active life, and Kew Gardens is again discharging what is stated to be "one of its most useful functions." The first number on the above list enables us to complete the enumeration of the dates of the volume of the *Bulletin* which, in defiance of accuracy, bears upon its title-page the date "1898": they are as follows:—

Date on wrapper and front page.		Stationery Office date of printing.
January, February	1898	March
March		May
April, May		June
June		June
July		July
August		August
September		August
October		September
November		October
December		December.

As the "December" number seems to have been printed in that month, it would seem that the delay of eight months—for it

was not issued until August, 1899—may be accounted for by the inclusion in it of the index to the volume for 1898.

With regard to the numbers for the present year, it cannot be said that science has suffered to any serious extent from the delay in their publication. The issue for "January and February" contains an interesting "Moss-flora of Kew Gardens" by Mr. E. S. Salmon, and the description of a new *Nectria* (*N. Bainesii*) by Mr. Massee, which of course dates from July: but, apart from these, the contents consist of official correspondence and reprints from various Foreign Office reports and from magazines, English and foreign, prefaces to official works, and the like. From this it would appear that the cause of the extraordinary delay in publishing the *Bulletin* may be accounted for by the lack of suitable material, but this hardly justifies the continued and systematic inaccuracy in the matter of dating which has characterized the *Bulletin* throughout its existence, and which cannot fail in the future to cause inconvenience.

An even more striking example of dilatoriness may be found in *Nature* for August 10th, where, under the heading "Floras from the Royal Gardens, Kew," are noticed the parts of the *Flora Capensis* and *Flora of Tropical Africa* issued in 1896, 1897, and 1898. The article in question, however, says very little about the books on which it is ostensibly based, and that little shows no special knowledge; indeed, it is not always accurate, as when it is implied that the earlier volumes of the *Flora Capensis* were Kew publications, whereas they were issued at Dublin and at Cape Town. The article is in fact mainly devoted to an eulogium upon the management of Kew, of the familiar type, and to a denunciation of the "preposterous proposal to throw the Gardens open to cyclists!" which, we are told, "may be taken as symptomatic of a craze." We have no desire to see the cyclist careering about Kew Gardens, but we cannot help remembering that the perfectly reasonable and subsequently granted request for the earlier opening of the Gardens was met in certain quarters by equally strenuous and oddly-worded protests. It is, we think, a little unfortunate to refer to the Floras indicated as an example of "continued progress": the Cape Flora remained in abeyance about a quarter of a century, and the Tropical African Flora for twenty years.

The writer of the notice seems to consider that the value of the Floras is largely enhanced by the proximity of the Kew Herbarium to the Royal Gardens. Mr. Bentham, however, said he had published several thousand new species, but had examined very few of them in a living state. Still more amusing is the suggestion that the absence of living plants is mainly responsible for synonymy: "If all descriptive botanists were able, as is possible at Kew, to look at the dry bones (!) of the plants with which they deal with some consideration of the form which clad them when alive, we should be spared much of that prolific synonymy which is the bane of the systematist." The writer would know, if he read his *Journal of Botany* or examined more closely the Floras which he is professing to review, that Kew botanists are responsible for their full share of the synonymy to which he objects, and that in spite of the proximity of the Gardens to the Herbarium.

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CONTENTS.

	PAGE
Alabastra Diversa.—Part V. By SPENCER LE M. MOORE, F.L.S. (concluded)	401
Somerset Plants. By C. E. SALMON	408
Diatoms of St. Vincent, West Indies. By EDMUND GROVE	411
Notes on Bristol Plants. By JAMES W. WHITE, F.L.S., & DAVID FRY	417
A Question of Authorship. By the EDITOR	419
Hieracium cymbifolium, sp. n. By the Rev. W. H. PURCHAS, L.Th.	421
Rhodesian *Polypetalæ*. By EDMUND G. BAKER, F.L.S.	422
John Hutton Pollexfen. By EDWD. A. L. BATTERS	438
SHORT NOTES.—Staffordshire Mosses.—*Pertusaria incarnata*.—Middlesex Mosses.—Flora of Cheshire .	440
NOTICE OF BOOK:— The Origin of the British Flora. By CLEMENT REID, F.R.S., &c.	441
Articles in Journals	444
Book-Notes, News, &c.	446

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THE

JOURNAL OF BOTANY

British and Foreign

EDITED BY

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THE JOURNAL OF BOTANY was established in 1863 by Dr. Seemann. In 1872 the editorship was assumed by the late Dr. Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

Without professing to occupy the vast field of general Botany, the Journal has from its inception filled a position which, even now, is covered by no other periodical. It affords a ready and prompt medium for the publication of new discoveries, and appears regularly and punctually on the 1st of each month. While more especially concerned with systematic botany, observations of every kind are welcomed. Especial prominence has from the first been given to British botany, and it may safely be said that nothing of primary importance bearing upon this subject has remained unnoticed.

Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains. Many important monographs and other works first appeared in its pages. In 1896 it became necessary to increase its size, owing to the number of papers sent for publication: the number of plates was at the same time augmented.

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ALABASTRA DIVERSA.—Part V.

By Spencer Le M. Moore, F.L.S.

(Concluded from p. 375.)

(Plates 401, 402.)

Wedelia diversipapposa, sp. nov. Ramosa, appresse strigoso-pubescens, foliis oppositis brevipetiolatis lanceolatis rarius ovato-lanceolatis utrinque acutis paullo supra basin triplinerviis, capitulis paucis terminalibus vel ex axillis foliorum summorum ortis campanulatis, pedicellis folia subæquantibus, involucri phyllis extimis ovatis vel ovato-lanceolatis interioribus lanceolatis omnibus obtuse acutis et appresse strigosis, receptaculi paleis ovato-oblongis cuspidatis tenuiter carinatis, ligulis circa 8 apice bifidis denticulatisve, achæniis immaturis a latere compressis oblongis, pappo e squamis conspicuis laceratis constante adjectis aristis 2–4 inter se æquilongis vel inæquilongis.

Hab. Buluwayo, Rhodesia; *Dr. R. Frank Rand* (Herb. Mus. Brit.).

Folia modice 3·0–5·0 cm. long., 1·0–2·3 cm. lat., supra et (præsertim in nervos) subtus pilis brevibus appressis strigosis onusta, subtus pallidiora. Capitula circa 2·0 cm. diam. Involucri phylla extima 0·8–0·9 cm. long., 0·4 cm. lat.; interiora 0·6 cm. long., vix 0·2 cm. lat., omnia deorsum coriacea necnon aliquantulo dilatata. Receptaculi paleæ 0·7 cm. long., deorsum integræ vel fere integræ, sursum erosulæ et ciliolatæ. Ligulæ 1·0 cm. long., 0·6 cm. lat., vivide aurantiacæ, atro-lineatæ. Achænia hirsuta, 0·2 cm. long. Pappi squamæ 0·08 cm. long.; aristæ pallidæ, scabriusculæ, longiores 0·3 cm. attingentes.

The pappus of this plant is somewhat aberrant for the genus, the other species, if with awns to the pappus, not having more than two such. In the present case either two or three awns are most commonly met with, four being rather the exception. I cannot, however, feel any warrant for founding a new genus upon this small peculiarity. *W. diversipapposa* has much the appearance of *W. menotricha* Oliv. & Hiern, the leaves of which are much more scabrous, the involucral leaves of the inner series are harder, and the pappus is normal for the genus.

Pentzia Eenii, sp. nov. (Tab. 401 B). Elata, caule erecto sursum parce ramoso, foliis a basi ipsa pinnatilobatis segmentis utrinque 5–10 foliorum summorum minorum vero paucioribus segmentis basalibus confertis et cauli approximatis modicis ima basi unilobulatis ceterum integris vel iterum lobulatis linearibus callosoapiculatis pubescentibus, capitulis in corymbis pluricephalis terminalibus dispositis majusculis subhemisphæricis pedunculis folia excedentibus nudis vel subnudis fultis, involucri bracteis 2-seriatis ovatis vel ovato-oblongis obtusis margine scariosis, receptaculo elevato minute alveolato, achæniis calvis.

Hab. Damaraland; *T. G. Een*, 1879 (Herb. Mus. Brit.).

Planta saltem 10·0 cm. alt. Radix deest. Caulis pallidus, striatus, puberulus. Folia modica 2·0–2·5 cm. long.; lobi rigiduli, plerumque 0·5–0·7 cm. long. Capitula circa 0·7 cm. diam. Involucri bracteæ 0·2 cm. long. Corollæ vix 0·2 cm. long. $\frac{1}{4}$–5-fidæ tubus deorsum glanduloso-pilosus et 0·03 cm. diam. sursum usque 0·1 cm. amplificatus; lobi oblongo-ovati, obtusi. Achænia quadrangulari-cylindrica, vix 0·1 cm. long. et lat., basi levissime angustata, faciebus punctis albis microscopicis crebre onustis.

To be compared with *P. pinnatifida* Oliv. (Ic. Plant. t. 1340), from which it can easily be told by the different lobing of the leaves, the hemispherical less crowded capitula, shorter involucral scales, epappose achenes, &c.

Cineraria Eenii, sp. n. Parvula, herbacea, erecta, caule gracili sursum sparsim ramoso crebro folioso glanduloso-piloso vel glabrato, foliis sessilibus oblanceolatis vel oblanceolato-obovatis eleganter et crebro et irregulariter inciso-lobulatis rarius pinnatifidis nequaquam lyratis basi auriculatis minute glandulosis vel fere omnino glabris, cymis pauci- vel pluricapitulatis apertis, pedunculis bracteis 1–2 linearibus subulatisve onustis, involucro campanulato 14-phyllo ecalyculato sparsim et minute glanduloso, ligulis 8 involucro longioribus, achæniis pubescentibus, pappo albo flosculis breviore.

Hab. Damaraland; *T. G. Een*, 1879 (Herb. Mus. Brit.).

Planta circa 15·0 cm. alt. Caulis 0·2 cm. crass., in longitudinem plane striatus. Folia 3·5–4·0 cm. long., superiora vero usque ad 1·0–2·0 cm. miniata, obtusa vel acuta, tenuiter membranacea, in sicco viridia. Involucra 0·5 cm. long. et lat.; phylla deorsum carinata. Radii flosculi 1·0 cm. long.; ligulæ circa 0·2 cm. lat., verisimiliter luteæ nisi aurantiacæ. Achænia 0·12 cm. long. Pappi setæ circa 0·5 cm. long.

Allied to several species, such as *C. Schimperi* Sch. Bip., *abyssinica* Sch. Bip., *kilimandsharica* Engl., and *bracteosa* O. Hoffm., but easily recognised by the irregularly incised leaves without either petiole or terminal lobe, and the ecalyculate 14-leaved involucre.

Senecio (§ Leptophylli) **Randii**, sp. n. Glaber, caulibus herbaceis ascendentibus gracilibus e rhizomate crasso oriundis deorsum foliosis sursum subnudis, foliis sessilibus obscure decurrentibus lineari-oblanceolatis serrulato-dentatis vel denticulatis obtusis deorsum gradatim attenuatis superioribus minoribus, capitulis ad apicem ramulorum solitariis vel binis late campanulatis, pedunculis elongatis distanter squamatis, involucri glabri sparsim calyculati phyllis circa 20, radii flosculis 12 reflexis disci ultra 100, achæniis pubescentibus.

Hab. Salisbury, Rhodesia; *Dr. R. Frank Rand*, Sept. 1898 (Herb. Mus. Brit.).

Tota planta circa 16 cm. alt. Rhizoma circa 1·0 cm. crass., basi radices sat crassas emittens, sursum squamellis parvis crebro obductum. Folia 1·5–2·0 cm. long. (superiora vero modo 0·5 cm.) et 0·2–0·3 cm. lat., margine paullulum revoluta, crassiuscula, in sicco læte viridia. Pedunculi 5·0–10·0 cm. long., ipso sub capitulo

parum dilatati; squamellæ subulatæ, 0·1–0·2 cm. long. Calyculi phylla squamellis similia. Capitulum 0·6 cm. long., circa 0·8 cm. lat. Radii flosculi 0·65 cm. long.; ligula lineari-oblonga, obtusissima, 0·4 cm. long.; disci flosculi 0·4 cm. long. Achænia immatura 0·1 cm. et pappi setæ 0·3 cm. long.

A very distinct species, to be placed in the genus near *S. Burchellii* DC. There are, however, many points of difference between the two in respect of the leaves, the inflorescence, number of involucral leaves and disc and ray-florets, &c.

Euryops Osteospermum, sp. nov. Erecta, elata, ramosa, crebro foliosa, caule sat crasso primo dense lanato mox araneoso, foliis sessilibus nequaquam confertis obovato-oblanceolatis deorsum longe angustatis integris sursum dentato-lobatis mox puberulis glaucescentibus, capitulis mediocribus terminalibus raro axillaribus pedunculis pro genere brevibus fultis, involucri campanulati phyllis 13 ima basi connatis glabris, achæniis cylindraceis 5-costatis costis pubescentibus, pappi setis scabriusculis.

Hab. Salisbury, Rhodesia; *Dr. R. Frank Rand*, July, 1898 (Herb. Mus. Brit.).

Vix usque 30 cm. alt. Caulis deorsum circa 0·4 cm. diam., frutescens. Folia inferiora 6·0 cm. attingentia et 2·0 cm. lat.; superiora 2·0–3·0 cm. long., vix 1·0 cm. lat., sursum cartilagineo-marginata, membranacea, in sicco viridia. Pedunculi circa 2·0 cm. long., basi pubescentes. Capitula circa 1·0 cm. diam., multiflora. Involucri phylla subæqualia, 0·5 cm. long., in longitudinem striata. Receptaculum breviter alveolatum. Radii flosculi fœminei circa 12 et (achæniis exemptis) 0·9 cm. long.; disci flosculorum 0·7 cm. long. limbus oblongus. Achænia 0·2 cm. et pappi setæ 0·4 cm. long.

A species with much the look of some forms of *Osteospermum moniliferum* L., hence the name here proposed for it. Its nearest ally is *E. Dregeana* Sch. Bip., which has different and congested leaves (those of *E. Osteospermum* being evenly distributed up the stem), much longer peduncles, differently shaped capitula, &c.

Dr. Rand also sends from Salisbury (No. 109 in Herb. Mus. Brit.) what I take to be a variety of this (var. *parvifolia* nob.). It is slenderer in habit than the type, its leaves do not exceed 3 cm. in length and are usually shorter, the peduncles are longer (up to 8 cm.), and the receptacle is scarcely alveolate. These characters may perhaps be of specific value.

Othonna ambifaria, sp. nov. Glabra, caule herbaceo ascendente deorsum crebro folioso sparsim ramuloso, foliis lanceolatis obtusis basi late amplexicaulibus glaucescentibus uninerviis, corymbis paucicapitulatis gracilibus, pedunculis nudis vel rarisquamosis, involucri phyllis 6–7 subæquilatis vel 1–2 latioribus, floseulis 15 involucrum bene excedentibus omnibus hermaphroditis, achæniis elongatis alteris compressis alteris subteretibus puberulis.

Hab. Near Shashi river, Rhodesia; *Dr. R. Frank Rand*, Jan. 1898 (Herb. Mus. Brit.).

Planta saltem 20 cm. alt. Caulis fistulosus, multistriatus. Folia 5·0–7·0 cm. long., 0·5–1·0 cm. lat., membranacea, superiora usque

ad 2·0 cm. miniata. Pedunculi squamæ rarissimæ, usque ad 0·3 cm. reductæ. Capitula circa 1·0 cm. diam. Involucri phylla deinde libera, 0·6 cm. long., 0·15–0·23 cm. lat., anguste albo-marginata. Flosculi (achæniis exemptis) 0·8 cm. long., purpurei. Styli rami penicillati. Achænia 0·4–0·5 cm. long., circa 10-costata, cylindracea vel linearia nequaquam ovata, utrinque levissime attenuata. Pappi setæ 0·6 cm. long., scabridæ.

A somewhat remarkable plant with the appearance of an *Othonna*, but without the central sterile florets characteristic of that genus. In this respect it is a *Senecio*, but the usually unequally broad involucral leaves are a character of *Othonna*. The compressed achenes show a tendency towards *Cineraria*, but as they are never ovate, while some indeed may be subterete, and as, moreover, the habit is not that of *Cineraria*, the preferable course seems to be description of this as an abnormal *Othonna*, for I cannot bring myself to propose still another genus in this already much subdivided group.

Cullumia Massoni, sp. nov. Copiose ramulosa, foliis pro genere parvis imbricatis erecto-appressis lanceolatis apice pungentibus in marginem cartilaginem reflexum bifarie ciliatis, involucri parvi campanulati phyllis exterioribus foliis consimilibus, receptaculi alveolis in marginem denticulatis, achæniis clavatis deorsum 8-costatis calvis.

Hab. Cape Colony ; *Francis Masson* (Herb. Mus. Brit.).

Ramuli attenuati, 0·1 cm. diam. Folia modo 0·2–0·3 cm. long., cauli plus minus appressa. Involucrum vix 1·0 cm. long., 0·5 cm. lat. ; phylla extima 0·25 cm., intima lanceolata, acuminata, ciliolata rarius spinoso-ciliata, extus strigosa, usque ad 0·6 cm. long. Flosculi desunt. Achænia 0·6 cm. long., eleganter polita, sursum obscurissime costata.

The delimitation of species in this genus depending almost entirely upon the leaves, the absence of florets from Masson's specimens is not a matter for regret. The leaves of the plant here described are most like those of *C. sulcata* Less., although still markedly dissimilar to them as the description sufficiently shows. But the comparison ends here, since *C. sulcata* has quite different involucres. The position of *C. Massoni* in the genus is near *C. pectinata* Less. and *C. ciliaris* R. Br., but it can be at once told from both of them, the greatly reduced leaves being more closely imbricate than are those of *C. pectinata*, and without the long reflexed spine of *C. ciliaris* ; its capitula also are smaller than those of the other two.

A small unnamed specimen in the Kew Herbarium collected by Mundt would appear to be referable to this species.

Sonchus macer, sp. nov. Nana, diffusa, subaphylla (deorsum solummodo foliosa), caulibus gracilibus glabris e rhizomate dense fusco-lanato oriundis, foliis oblongis linearibusve integris vel obscure denticulatis apice albido-apiculatis, inflorescentia diffusa pauci- (circa 12-) capitulata, capitulis pedunculis sibi ipsis æquilongis vel subæquilongis fultis, involucri anguste cylindrici phyllis exterioribus ovatis vel ovato-oblongis albo-marginatis interioribus 4 (rarissime

3) linearibus obtusis glabris, flosculis quove in capitulo 4 (rarissime 3), achæniis lineari-oblongis utrinque leviter angustatis pappo sibi ipsis longiore coronatis.

Hab. Salisbury, Rhodesia; *Dr. R. Frank Rand* (Herb. Mus. Brit.).

Tota planta circa 5·0 cm. alt. Rhizoma 0·8 cm. long. et totidem diam. Folia circa 0·8 cm. long., superiora quam inferiora latiora. Involucri phylla exteriora 0·1–0·3 cm. interiora 1·5 cm. long. Achænia multicostata costis nequaquam scabris, albida, 0·65–0·7 cm. long., medio 0·1–0·15 cm. lat. Pappus 0·8 cm. long.

To be compared with *S. Fischeri* O. Hoffm., from which it differs by reason of its lowly habit and woolly rhizome, its small leaves, 4 (not 5) inner involucral leaves, 4-flowered capitula, and broader achenes crowned by a pappus longer than themselves.

Convolvulus (§ Pannosi) **omanensis**, sp. nov. Planta dense albide hirsuto-tomentosa, ramulis floriferis ascendentibus e caulibus brevibus dense foliatis erectis oriundis, foliis parvis lineari-spathulatis in petiolum latum elongatum desinentibus maxime plicato-rugosis ramulorum summis subplanis, capitulis ovoideis racemum caules dense foliatos excedentem formantibus pedunculis axillaribus folia plerumque subæquantibus fultis circa 6-floris, bracteis lanceolatis acutis calyci æquilongis, sepalis lanceolatis acutis dorso hirsutissimis, corolla extus hirsuta calyce duplo longiore, ovario sericeo-lanato.

Hab. Oman, Arabia, 1898; *Dr. A. S. G. Jayakar* (Herb. Mus. Brit.).

Rhizoma simplex, 0·5 cm. diam., cortice subereo pallide fusco obductum. Caules dense foliati, 2·0–3·0 cm. long., hirsutia pallide fusca gaudientes. Folia demum pallide rubescentia in toto usque 2·5 cm. long., plerumque vero breviora, 0·4 cm. lat.; petioli 1·5 cm. attingentes; folia floralia sessilia vel brevipetiolata, 0·7–1·2 cm. long., summa breviora. Sepala 0·6 cm. long., intus rubro-lineata. Corolla vix 1·0 cm. diam. Capsula glabra, 0·4 cm. long. Semina quove in capsula 2–4, nigra, minutissime lepidota, vix 0·3 cm. long.

Closely allied to *C. sericeus* Burm. and *C. Schimperi* Boiss., though with its hirsute ovary it is evidently not identical with either; indeed, one of the characteristics of the § *Pannosi* being a glabrous ovary, the present plant cannot be considered a typical representative of that section, although its reference there seems the preferable course. Both the species above named have the curious plicate leaves of the Oman plant—this plication being a method, apparently, whereby the area of leaf exposed to the direct rays of the sun is reduced—but the habit of both is different. Moreover *C. sericeus* has a very short tomentum, smaller and sessile or shortly petiolate leaves, and larger globose capitula; the leaves of *C. Schimperi* being longer and broader, and the caudate sepals nearly twice as long as those of the plant here described.

Hildebrandtia Vatke (Tab. 402 A & B).—This genus has recently been shown by Dr. Hans Hallier (Engler, Bot. Jahrb. xxv. p. 510)

to be dicœcious, sharing alone with *Cladostigma* Radlk. this peculiarity among *Convolvulaceæ*. In Vatke's original description of *H. africana* two of Hildebrandt's numbers were cited—namely, Nos. 1525 and 1534—the latter of which is attached to a plant having flowers markedly different from those of No. 1525, inasmuch as their two outer sepals are not partly adnate to the pedicel and enlarged so as to enclose the flower and fruit, which is a main characteristic of the genus. Dr. Hallier shows that No. 1534 is, in reality, the male plant, while the anthers of No. 1525 are greatly reduced in size and do not produce pollen. The female plant of a second species (*H. somalensis* Engl.) was subsequently described.

I have lately had under observation at the Museum two Hildebrandtias from Somaliland which, as I am unable to refer them to either of the above, I here proceed to characterize. The first of the two was discovered by Mrs. Lort Phillips; the second came in the valuable parcel presented to the Museum in 1895 by Dr. Donaldson Smith.

H. undulata, sp. nov. Ramosa, ramis divaricatis apice nudis sed verisimiliter espinosis, novellis foliis et (florum masculorum solummodo) calycibus albo-sericeis, foliis oblongo-oblanceolatis obtusissimis vel emarginatis nonnunquam retusis in petiolum brevem extenuatis utrinque pilis sericeis dibrachiatis malpighiaceis appressis dense obsitis, ramulis abbreviatis pluri- (raro uni-) floris, floribus tetrameris masculis breviter pedunculatis fœmineis pedunculis gracilibus folia æquantibus vel breviter excedentibus appresse puberulis vel pubescentibus suffultis, bracteolis modicis, sepalis exterioribus fl. masc. oblongo-ovatis obtusis interiora oblonga paullo superantibus fl. fœm. rotundatis utrinque obtusissimis margine sparsim undulato-crenulatis nonnunquam subintegris glabris, sepalis interioribus minimis ovato-rotundatis obtusis concavis, corolla fl. masc. semi-4-fida fl. fœm. $\frac{2}{3}$–4-fida extus obscure et appresse puberula lobis ovatis obtusis, staminibus 4, filamentis fl. masc. inæquilongis basi dilatatis fl. fœm. antheris omnino carentibus, capsula ignota.

Rami circa 0·3 cm. diam. (plantæ masc. vero tenuiores), cortice tenero cinereo areolatim fisso obducti, seniores reliquiis ramulorum abbreviatorum folii- et floriferorum tuberculati. Folia modica 0·7 cm. long., 0·3–0·4 cm. lat.; petioli 0·1–0·2 cm. long., appresse sericei. Bracteolæ filiformes, rufo-hirtulæ, 0·15 cm. long. Fl. masc. pedunculus vix 0·1 cm. long., fl. fœm. 0·6–0·8 cm. long. Fl. masc. calyx 0·1–0·2 cm. long., fl. fœm. sepala exteriora in toto 0·7–0·8 cm. long., cujus vix pars tertia pedunculo adhærit, membranacea, arcte reticulato-venosa, læte viridia, sepala interiora vix 0·1 cm. long. Corolla 0·7 cm. long.

Differs from *H. africana* by reason of, *inter alia*, its smaller leaves, glabrous undulate-crenulate outer sepals of the female flower, and filaments of the female flowers without any sign of an anther. *H. somalensis*, besides being pentamerous, has its female flowers invested by a quite differently shaped calyx.

Dr. Donaldson Smith's plant I propose to name—

H. obcordata, sp. nov. Ramis divaricatis cinereis areolatim fissis, foliis breviter petiolatis obcordatis basi cuneatis supra glabris

subtus appresse puberulis 0·8 cm. long. 0·5 cm. lat. firmis in sicco læte viridibus, floribus fœmineis singillatim vel binatim oriundis, pedunculis capillaribus 0·8–1·3 cm., sepalis fructum maturum occludentibus ambitu subcircularibus obtusissimis integerrimis basi cuspidato-acuminatis eximie reticulato-venosis glabris in sicco pallide viridibus evanide puniceis 2·0 cm. long. 1·5–1·8 cm. lat., capsulis subsphæroideis 0·5 cm. long. tenuiter crustaceis valvis pallide brunneis intus subnitidis, seminibus fusco-purpureis vix 0·3 cm. long.

It will be noticed that the specimen on which this species has been founded is incomplete, both male and female flowers being absent, and, indeed, it was for this reason that Dr. Rendle decided not to give it a name. I think, however, that, while describing Mrs. Lort Phillips's plant, the material being just sufficient to furnish a diagnosis, and, moreover, to complete a clavis of the genus attempted below, the step here taken is not indefensible.

I propose to utilise, in drawing up the clavis, the shape of the large sepals of the female flowers. Those of *H. africana* and *H. undulata* are rounded both above and below, while the other two species have the organs in question narrowed below and running down for a short distance as wings to the peduncle. Whether or no this peculiarity is associated with the number of parts in the floral whorls cannot be decided until flowers of *H. obcordata* come to light.

On the above principle the species may be marshalled thus:—

§ *Leptopoda*. Fl. fœm. sepala exteriora utrinque rotundata; pedunculo exalato.

Fl. fœm. sepala exteriora integerrima, sericea: antheræ parvæ . . . . . } *H. africana.*

Fl. fœm. sepala exteriora undulato-crenulata, glabra: antheræ omnino obsoletæ . . } *H. undulata.*

§ *Pteropoda*. Fl. fœm. sepala exteriora deorsum attenuata; pedunculo sub flore alato.

Folia angusta. Calyx fl. fœm. oblongo-ovatus. Pedunculo modico 0·5 cm. long. . . . } *H. somalensis.*

Folia lata, obcordata. Calyx fl. fœm. subcircularis. Pedunculo modico 1·0 cm. long. } *H. obcordata.*

Description of Plates 401, 402.

(The sketches of the plants are natural size; the other drawings are variously magnified.)

Plate 401.—A. *Eenia damarensis* Hiern & S. Moore. 1. Palea of the receptacle flattened. 2. Young floret with its subtending palea. 3. Mature floret. 4. Part of androecium opened out. 5. Style-arms. 6. Pappus-scale.—B. *Pentzia Eenii* S. Moore. 1. Floret. 2. Anthers. 3. Style-arms.

Plate 402.—A. *Hildebrandtia obcordata* S. Moore.—B. *H. undulata* S. Moore. 1. Female plant. 2. Flower of the same in outward view. 3. Male plant. 4. Male flower detached. 5. Female flower opened out.—C. 1. *Hæmacanthus coccineus* S. Moore. (For description see *Journ. of Bot.* 1899, p. 63.) 2. Anther. 3. Pollen grain. 4. Ovary opened to display one of its cells.

SOMERSET PLANTS.

By C. E. Salmon.

These notes are the result of a visit last summer to the picturesque village of Porlock Weir, in the county of Somerset (v.-c. 5). The Rev. R. P. Murray's excellent Flora of the county, published in 1896, was extremely useful; but one or two additions were able to be made, chiefly to Division 2 of the Flora, but in one or two cases to the whole v.-c. 5: these latter are distinguished by an asterisk. The most interesting of these was certainly *Euphorbia hiberna*, which occurred quite plentifully in the romantic valley of Badgeworthy, where the river forms the boundary between Somerset South and Devon North. Here it grew luxuriantly on both sides of the stream, and is, I believe, an addition to the county flora on the Somerset side, and a new station to those already known for it in Devon, on the further bank. Another plant that was a very welcome sight was *Polygonum Roberti*, which is doubtfully recorded in Top. Bot. under "5 or 6. Somerset. 'Borrer,'" so under the circumstances it was particularly pleasing to place at least one undoubted locality for it in Somerset South, v.-c. 5. I may mention here that the Rev. Augustin Ley has verified a specimen of *Pyrus latifolia* Syme, bearing the label "Oakleigh, nr. Keynsham. 1886. Coll. D. Fry," as the *type* is unrecorded in the Flora: the locality is in Division 10. The Rev. W. H. Coleman compiled a list of plants, for the Flora, observed within five and ten miles of Minehead and Dunster, but it seems as well to put on record definite localities for all plants where this list alone is responsible for their record in Division 2. I must thank Mr. Arthur Bennett, the Revs. E. F. Linton and W. Moyle Rogers, and other botanists mentioned in the list below, for so kindly determining many critical species and varieties.

**Papaver Rhœas* L. var. *strigosum* (Boenn.). 2. Close to the shore at Porlock Weir. This variety is not mentioned in Mr. Murray's Flora.

Glaucium flavum Crantz. 2. Beach at Porlock Weir, between Watchet and Blue Anchor, Dunster, etc.

Fumaria confusa Jord. 2. Porlock Weir.

Lepidium hirtum Sm. 2. Beach near Decoy, Porlock Weir.

Malachium aquaticum Fr. 2. Dunster. No definite locality previously in this division.

**Montia fontana* L. var. *erecta* Pers. 2. Near Weir Water, Oareford. No definite locality previously even for the aggregate in this division.

Hypericum Androsæmum L. 2. Greenaleigh Wood, near Minehead.

Lavatera arborea L. 2. Near the sea, about Porlock Weir. Unrecorded in this division, but scarcely native in this locality.

Geranium columbinum L. 2. Selworthy. — *G. striatum* L. 2. Roadside, Selworthy. Not native.

Medicago arabica Huds. 2. Selworthy Churchyard.

Melilotus officinalis Lam. 2. Between Blue Anchor and Dunster; Dunster. No definite localities previously in this division.

Lathyrus sylvestris L. 2. Beach near Decoy, Porlock Weir; between Watchet and Blue Anchor.

Rubus pyramidalis Kalt. 2. Glen behind Worthy, Porlock Weir. "Undoubtedly *R. pyramidalis* Kalt., though a very weak form of it," Mr. Rogers reports.—*R. leucostachys* Schleich. 2. Field, Worthy, Porlock Weir. "Certainly very near to *R. leucostachys*, but derived, I think, from the varying hybrid *R. leucostachys* × *rusticanus*," W. M. R. — *R.* ———. 2. Glen behind Worthy, Porlock Weir. On this plant Mr. Rogers wrote, "I cannot match these specimens. On the whole they seem nearest to *R. anglosaxonicus* Gelert, while differing from that species in several particulars, and especially in the longer pointed and less coarsely toothed leaflets, and the much broader panicle but little narrowed above and with darkly coloured unfelted rachis. At first sight perhaps it rather suggests my var. *anglicanus* of *R. radula* Weihe; but it is quite without the true Radulan stem-clothing."

**Pyrus Aria* Ehrh. var. *rupicola* Syme. 2. Culbone Cliffs. This variety, kindly determined for me by the Rev. Augustin Ley, had only been doubtfully recorded from Somerset previously, from Long Knoll, in Division 7. May not this be the tree recorded in the Somerset Flora under *P. latifolia* Syme, var. *decipiens* N. E. Br., with the locality "Culbone; C. C. Babington (probably this var., but I have not seen a specimen)"?

**Sedum rupestre* Huds. var. *majus* Syme. 2. Cliff near Porlock Weir (*fide* E. F. Linton). — *S. rupestre* Huds. var. *minus* Syme. 2. Culbone Cliffs (*fide* E. F. L.). — **S. Forsterianum* Sm. 2. Cliff near Porlock Weir (*fide* E. F. L.). Queried in the Somerset Flora as occurring, strangely enough, in this very locality (seemingly its only station in Somerset), whence it was reported by T. B. Flower in 1876.

Drosera rotundifolia L. 2. Valley behind Selworthy Church.

Peplis Portula L. 2. Near Weir Water, Oareford; by Horner Water. No definite localities previously in this division.

Epilobium angustifolium L. 2. Near Dunster Station.

Crithmum maritimum L. 2. Plentiful on rocks close to sea near Culbone. No definite locality previously in this division.

Fœniculum officinale All. 2. Between Porlock and Minehead.

Apium graveolens L. 2. Between Blue Anchor and Dunster.

Rubia peregrina L. 2. Between Porlock and Minehead.

Centranthus ruber DC. 2. Beach, Porlock Weir and cliffs towards Culbone, plentiful and well naturalized.

Tanacetum vulgare L. 2. Near Decoy, Porlock Weir.

Artemisia Absinthium L. 2. Porlock Weir; between Selworthy and Little Headon Common, plentiful.

Petasites officinalis Moench. 2. Bossington stream end.

Cichorium Intybus L. 2. Roadside near Porlock; field-sides near Hurlstone Point.

Hieracium Schmidtii Tausch. 2. Quarry between Minehead and

Greenaleigh: "Possibly var. *devoniense* F. J. H.," reports the Rev. E. F. Linton.—*H. vulgatum* Fr., approaching var. *Sciaphilum* Uech. (*fide* E. F. L.). 2. Cliff near Porlock Weir.

Wahlenbergia hederacea Reichb. 2. Near Weir Water, Oareford; Porlock Common; about Horner Water.

Glaux maritima L. 2. Porlock Weir.

Anagallis tenella L. 2. Valley behind Selworthy Church; Porlock Common.

Samolus Valerandi L. 2. Between Watchet and Blue Anchor. No definite locality in this division previously.

Erythræa pulchella Fr. 2. Between Watchet and Blue Anchor. Unrecorded previously for this division, which is in v.-c. 5 in Watson's Top. Bot., where it has no personal authority.

Cynoglossum officinale L. 2. Between Watchet and Blue Anchor.

Anchusa sempervirens L. 2. Both sides of the road between Porlock and Porlock Weir, well established.

Cuscuta Epithymum Murr. 2. Between Watchet and Blue Anchor. — *C. Trifolii* Bab. 2. On clover at Porlock Weir. No record previously in this division, *E. S. Salmon*.

Mimulus Langsdorfii Donn. 2. Plentiful by Oare Water at Malmsmead. This is the plant generally recorded as *M. luteus*, but Prof. Greene observed in this Journal for 1895 (pp. 4–7) that the above is its proper name.

Sibthorpia europæa L. 2. Porlock Weir, *E. S. Salmon*.

Veronica scutellata L. 2. Near Weir Water, Oareford. No definite locality in this division previously.

**Melampyrum pratense* L. var. *hians* Druce. 2. Extremely plentiful about Porlock Weir and Culbone Cliffs, also about Oareford and Malmsmead and in Homebush Wood Valley, behind Porlock. Very striking and typical with its orange flower and gaping lips, but seemingly hitherto not noticed in the whole of Somerset. May not the "var. *montanum* Johnst." of the Somerset Flora prove to be this variety? I could find no *montanum* in the locality given (Porlock), but only what Mr. G. C. Druce has named for me *M. pratense* L. var. *hians*, f. *angustifolia*, which at first sight is much like *montanum*.

Mentha rotundifolia Huds. 2. Beach near Bossington. abundant; West Luccombe, with *Melissa*, scarcely native; by Horner Water, above Horner, looking wild.

Lycopus europæus L. 2. Dunster; near Horner; Porlock Decoy.

Melissa officinalis L. 2. West Luccombe, not far from cottages.

Scutellaria minor Huds. 2. Valley behind Selworthy Church. Previously unrecorded for this division.

Marrubium vulgare L. 2. Minehead Warren, looking native. No definite locality previously in this division.

Stachys arvensis L. 2. Between Watchet and Blue Anchor.

Salicornia herbacea L. 2. Porlock Weir.

Suæda maritima Dum. 2. Porlock Weir.

**Polygonum Roberti* Loisel. 2. Dunster. Previously unrecorded with certainty for v.-c. 5.

**Euphorbia hiberna* L. 2. Plentiful in Badgeworthy Valley.

New to v.-c. 5, its only other recorded county in England being Devon N., adjoining.

Parietaria officinalis L. 2. Dunster; Selworthy; Bossington.

Iris fœtidissima L. 2. Between Porlock and Minehead.

Asparagus officinalis L. var. *altilis* L. 2. Between Blue Anchor and Dunster. In this division previously unrecorded.

Luzula maxima DC. 2. Malmsmead.

Potamogeton pusillus L., f. *pseudo-trichoides* Ar. Benn. 2. Ditches on Porlock Decoy. Mr. Arthur Bennett has seen the plant,

Ruppia rostellata Koch. 2. Ditches on Decoy, Porlock, plentiful. In Somerset Flora but one locality (in same division) for whole of Somerset.

Scirpus Savii Seb. & Maur. 2. Valley behind Selworthy Church; marsh near Horner. Evidently rare in Somerset, as 2 is the only division for which it is recorded in the Flora.

Carex pulicaris L. 2. Near Weir Water, Oareford; valley behind Selworthy Church. No definite localities previously in this division.—*C. divulsa* Good. 2. Roadside near Porlock.—*C. Œderi* Retz. 2. Near Weir Water, Oareford. Not recorded in this division before.—*C. rostrata* Stokes. 2. Badgeworthy Valley. Unrecorded for this division in Flora.

Chara vulgaris L. (*fide* H. & J. Groves). 2. Between Watchet and Blue Anchor, stream in field. New to this division.

DIATOMS OF ST. VINCENT, WEST INDIES.

By Edmund Grove.

The following is the result of an examination of various diatomaceous muds collected by Mr. H. H. Smith from pools, freshwater and brackish, in the island of St. Vincent.

List of localities and descriptions of gatherings.

1. "Diatom mud, leeward brackish water, Cumberland." A light silty clay. Diatoms very scarce.

2. "Diatom mud, windward side, pools slightly brackish. Seashore at Grand Sable." Has the appearance of a vegetable mud. Diatoms more numerous than last and of many species, mostly marine.

3. "Stagnant very dirty water, swampy place near sea-level, open Richmond estate, leeward side." A black mud mixed with sand. Diatoms very scarce. One slide only mounted.

4. "Cumberland, swamp by sea-shore, water very slightly brackish, warm." Silty light brown mud. Diatoms scarce.

5. "Swampy place near sea-level. Fitz-Hughes' estate, leeward." Silty light-coloured mud. Diatoms fairly plentiful, all freshwater species.

6. "Pools by sea-shore, Richmond estate (leeward). Water apparently quite fresh." Silty mud.

7. "Large stagnant pools, open, Hermitage estate, Cumberland Valley, 1000 ft."

8. "Richmond Valley, forest, 1000 ft. Cold pool."

9. "Cumberland estate (leeward), near sea-level, open place, slowly running, clear and rather cold water, swampy ground."

10. "Swampy pool, southern end of Island, near sea-level."

11. "Freshwater pool, mouth of Cumberland River (leeward), close to sea, but not brackish." Diatoms exceedingly scarce.

12. "Pools in swamp near sea-level. Freshwater, Greathead, south end of Island." Diatoms scarce.

13. "Fitz-Hughes' estate (leeward), open, boggy place, warm water puddles."

14. "Cumberland (leeward), stagnant ditches by sea-shore. Water very slightly brackish (1); close to the sea, quite salt from the tide-water (2)." Diatoms very scarce and of few species. I find no difference between (1) and (2) as regards the diatomaceous contents, except that in (1) there are rather more valves or fragments of the freshwater forms *Pinnularia major* and *P. viridis*.

15. "Dam, Fitz-Hughes' estate, open, near sea-level, water cold, constantly renewed and changing level." Two gatherings, which I have marked 15,1 and 15,2, but differing only in that 15,1 contains many more diatoms than 15,2.

16. "Cumberland Valley, 1000 ft. Forest by river. Cold water pools, boggy ground." Diatoms exceedingly scarce.

17. "Boggy open ground, near Kingstown, about 500 ft." Diatoms numerous, but few species.

18. "Richmond Valley, 800 ft., boggy place. Forest near river, cold." Material only enough to mount one slide. Diatoms exceedingly scarce.

19. "Bellair estate, southern end of Island. 1000 ft. open, boggy land. Cold ponds." Diatoms fairly numerous.

20. "Richmond Valley, 1200 ft. Forest near river, cold pool."

21. "Stagnant ditches, warm freshwater, near sea-level, open place, Brighton estate, southern end of Island." Material only sufficient for one slide. Diatoms very scarce.

22. "Stagnant, dirty water, Fitz-Hughes' estate, leeward, near sea-level, open." Diatoms extremely scarce.

23. "Cumberland, leeward, swampy land by sea-shore, water perhaps slightly brackish by infiltration." Diatoms extremely scarce. Next to none.

24. "Southern end of the Island, swamp at Greathead. Open, rather cold pools, freshwater." Diatoms scarce, but of several species.

25. "Large shallow pool, stagnant water, open field, Richmond estate, near sea-level. Dries up in dry seasons. Pool swarms with a large Rotifer." Diatoms fairly numerous, but of few species.

26. "Warm springs (about 120° F.), Wallibon Valley, 800 ft. Edge of forest."

27. "Stagnant ditches at sea-level, Cumberland, leeward. Water slightly brackish, from wash of tide."

28. "Upper Richmond Valley. 1500 ft. on stones in a cold

rapid mountain stream." Practically destitute of diatoms. One slide only mounted.

29. "Dam, Fitz-Hughes' estate. Leeward, near sea-level, open place. Water cold, constantly changing. Mud on the margin."

30. "Greathead, Calliagua, and Brighton swamps."

31. "Swampy pools, open, rather warm water, southern end of the Island, near sea-level, Greathead, Calliagua, and Brighton. Fresh water." Same neighbourhood as last. Two gatherings (30, 31).

32. "Fresh water, close to sea-shore, Calliagua (southern end of the Island), washed from confervoid growth." Quantity only sufficient for one preparation. Diatoms scarce, as might be presumed from their being obtained by washing Conferva.

33. "Upper Richmond Valley, 1800 ft. Rain pools in rocks by river." Sufficient for one preparation only. Nothing but two or three stray specimens, which may have been conveyed in process of cleaning.

34. "Warm springs (120° F.), Wallibon Valley, 800 ft., edge of forest."

35. "Wallibon Valley, 1000 ft. Forest near river. Cold pools."

36. "Warm springs (120° F.), Wallibon Valley, 800 ft., edge of forest." Compare 34.

37. "Fitz-Hughes' estate, 500 ft., open, cold pools."

38. "From large, stagnant, warm pools. Hermitage estate, Cumberland Valley, 1000 ft., open place. N.B. few species."

39. "Cumberland Valley, forest, 300 ft. From pools of water, boggy places."

40. "Freshwater pools, near sea-level, Camden Park estate, leeward, north of Kingstown."

41. "Swampy land pools, southern end of the Island, Greathead, Calliagua, and Brighton. Near the sea, but fresh water."

Note.—The remarks in inverted commas are the localities and descriptions given by the collector, which accompany the gatherings.

Marine Species.

Achnanthes brevipes Ag. var. *intermedia* (Kütz.) Cl. = *A. subsessilis* Kütz. 1.
Actinoptychus undulatus Ehr. 1, 2.
Amphora acutiuscula Kütz. 1, 4, 14, 27, 30.
A. bigibba Grun. 2.
A. Clevei Grun. 2.
A. alata Perag. 2.
A. formosa Cl. 2.
A. gigantea Grun. 2.
A. Grundleri Grun. 2.
A. mexicana A. S. 2.
A. obtusa Greg. 2.
A. ocellata Dank. var. *cingulata* Cl. 2.
A. ostrearia Bréb. var. *vitrea* Cl. 2.
A. Proteus Greg. 2.
A. spectabilis Greg. 2.
Aulacodiscus Petersii Ehr. 2.
Auliscus cælatus Bail. 2.
A. Macraeanus Grev. 2.
A. sculptus (W. Sm.) Ralfs. 2.
Biddulphia aurita Bréb. 2.
B. Edwardsii Febiger. 2.
B. pulchella Gray. 2.
B. reticulata Rop. 2.
B. Tuomeyii Bail. 2.
Campylodiscus latus Shadb. 2.
C. Thuretii Bréb. 2.
Campyloneis Grevillei (W. Sm.) Grun. 2.

Cerataulus lævis Ehr. 4, 9, 12, 15, 16, 19, 29, 41.
C. turgidus Ehr. 2.
Climacosphenia elongata Bail. 2.
Cocconeis pinnata Grey. 2.
C. scutellum Ehr. 2.
Coscinodiscus eccentricus Ehr. 2.
C. minor Ehr. 2.
C. nitidus Greg. 2.
C. nodulifer A. S. (? form of *C. fimbriatus*). 2.
C. radiatus Ehr. var. *media* Grun. 2.
Cyclotella striata Kütz. 2.—(*striata* var.) *subsalina* Grun. 4.
Dimeregramma marinum (Greg.) Ralfs. 2.
Epithemia Musculus Kütz. 1, 2, 4.
Eupodiscus radiatus Bail. 2.
Fragilaria capensis Grun. 2.
F. Schwartzii Grun. 2.
Grammatophora marina Kütz. var. *adriatica* Grun.? 2.
Hemidiscus cuneiformis Wall. 2.
Isthmia (*enervis* var.?) *capensis* Grun. 2.
Mastogloia (*Orthoneis*) *fimbriata* Brtw. 2.
M. Jelinckii Grun. 2.
M. minuta Grev. (? *M. cuspidata* Cl.). 2.
M. (*Orthoneis*) *ovata* Grun. 2.
M. (*Orthoneis*) *splendida* (Greg.) Grun. 2.
Melosira Borreri Grev. 32.
M. Jurgensii Ag. var.? 37 (rare).
M. sulcata Kütz. 1, 14, 27.—Forma *coronata*. 27.
Navicula approximata Grev. 2.—Var. *Kittoniana* (A. S.) Cl. 2.
N. (*Trachyneis*) *aspera* E. 2.
N. (*Diploneis*) *Bombus* E. 2.
N. braziliensis Grun. 2.
N. cancellata Donk. 2.
N. clavata Greg. (small form). 2.
N. crucicula W. Sm. 14, 27.
N. directa W. Sm. 2.
N. excavata Grev. 2.
N. (*Diploneis*) *exempta* A. S. 2.
N. exsul A. S. 2.
N. forcipata Grun. var. *suborbicularis* Grun. 2.—Var. *nummularia* Grev. 2.
N. formosa Greg. 1, 4, 12, 14, 24, 27, 30, 32, 41
N. fusca Greg. var. *delicata* A. S. 2.
N. gregaria Donk. 34 (doubtful).
N. irrorata Grev. 2.
N. lyra E. 2.—Var. *subcarinata* Grun. 2.—Var. *subelliptica* Cl. 2.
N. (*Dictyoneis*) *marginata* Lewis. 2.
N. nummularia Grev. 2.
N. Powellii Lewis. 2.
N. prætexta E. 2.
N. rectangulata Greg. var. *regula* Cl. 2.
N. Reichardtii Grun. 2.
N. (*Diadesmis*) *seminoides* Cl. & Gr. 12.
N. transfuga Grun. 2.
Nitzschia bilobata W. Sm. var. *minor*. 41.
N. fluminensis Grun. 2.
N. granulata Grun. 1, 10, 12, 14, 27, 32.
N. lanceolata W. Sm. 41.—Var. *minutula*. 30.
N. Liebetruthii Rab. var. 6.
N. marginulata Grun. 2.
N. marina Grun. 2.
N. obtusa W. Sm. var. *lævissima* Grun. 6.—Var. *scalpelliformis*. 32, 36.
N. panduriformis Greg. 2.—Var. *lata* (Witt.) Grun. 2.
N. plana W. Sm. 32, 40.
N. scalaris W. Sm. 1, 27, fragment.
N. sigma W. Sm. 2.—Var. *valida* Cl. 2.
N. stagnarum Rab. 41.
N. Tryblionella Hantz. var. *salinarum* Grun. 4?, 30, rare, 41.
N. vitrea Norm. var. *salinarum* Grun. 6, 9.
Plagiogramma Antillarum Cl. (? small form). 2.
P. caribæum Cl. 2.

Rhabdonema adriaticum Kütz. 2.
Raphoneis amphiceros E. 2.
R. surirella Grun. 2.
Roperia tessellata Grun. (*Eupodiscus tessellatus* Rop.). 2.
Stictodiscus parallelus (Grev.) forma *trigona* (*Tric. parallelum* Grev.). 2.
Surirella fastuosa E. 2.
S. inducta A. S. (? *S. striatula* var.). 12, 24, 30.
S. lata W. Sm. var. 2.
Synedra crystallina Kütz. 2.
S. Hennedyana Greg. 2.
S. lævigata Grun. 2.
S. superba Kütz. 2.
S. undulata (Bail.) Greg. 2.
Terpsinoë musica E. 4, 7, 11, 15, 19.
Triceratium affine Grun. 2.
T. alternans Bail. 4.
T. antediluvianum E. (*Amphitetras*). 2.
T. (*ornatum* var.) *pentracinus* Wall. 2.
T. robertsianum Grev. 2.—Forma *inermis*. 2.
T. spinosum Bail. 2.
Tropidoneis lepidoptera Greg. var. *samoensis* (Grun.) Cl. S.N.D. p. 28. 4, 30 (one observed).

Freshwater and Slightly Brackish.

Achnanthes exigua Grun. 5, 6, 18, 19.
A. inflata Kütz. 6, 8, 9, 15, 19, 26, 29, 33, 37.
A. marginulata Grun. 6?, 9.
Amphora coffeiformis Ag. 17, 19, 30 (rare), 32 (sparingly), 33.
A. Normani Rab. 6 (rare), teste Cleve.
Cocconeis Placentula Ehr. 19 (one observed).
Cyclotella Meneghiniana Kütz. 12, 24, 31, 41.
C. Kützingiana Thw. 24.
Cymbella Cistula Ehr. 6 (scarce).
C. ventricosa Kütz. 6 (scarce), 9.
Denticula tenuis Kütz. 18.
D. thermalis Kütz. 6, teste Cleve.
Epithemia gibba Kütz. var. *ventricossa* Grun. 7.
E. gibberula Kütz. 5, 6, 9, 12, 13, 15, 17, 19, 24, 26, 27, 30, 31, 33, 34, 36, 41.
Eunotia Arcus Ehr. 15? (frustule only seen).
E. bicapitata Grun. 10 (rare), 37.
E. Formica Ehr. 24?
E. gracilis Rab. 6.
E. major Rab. 9, 15.
E. Monodon E. 4?, 6, 9.—Forma *curta*. 9, 30 (rare).
E. pectinalis Rab. 9, 10, 12, 31, 37, 38, 40, 41.—Var. *stricta*. 9, 10, 12, 19, 21, 24, 30, 31.—Var. *undulata*. 10.—Var. *ventricosa*. 9, 37.
E. Rabenhorstii Cl. et Grun. 6, teste Cleve.
Gomphonema geminatum Ag. 26 (a fragment seen).
G. gracile Ehr. 19, 41.—Var. *laxa* Cl. 5.—Var. *lanceolata*. 6, 9, 12.—Var. *major*. 19, 30, 31, 37, 40, 41.—Var. *naviculacea* W. Sm. 30.
G. lanceolatum Kütz. 5, 11, 19, 21, 24, 30, 31, 37, 40, 41.—Var. *insigne* Greg. 6, 9, 10, 12, 15, 19, 31, 41.
G. parvulum Kütz. 5, 6, 19, 21, 24, 30, 41.
G. subclavatum Grun. 24? (one seen).
Melosira anastomosans Grun. 18, 19.
M. crenulata Kütz. 3 (one specimen observed).
M. roseana Grun. 6, 15, 36, 39.—Var. *spiralis*. 36.
M. undulata Kütz. 18.
Naricula ambigua Ehr. 4.
N. bacilliformis Grun. 5, 41.
N. bacillum Ehr. var. *minor*. 19.—Var. 21.
N. (*Caloneis*) *bodosensis* Pant. var. 6, teste Cleve.

N. cincta Kütz. 5, 32 (sparingly), 41.—Var. *Heufleri* Grun. 5, 6, 12, 15, 19 (rare).
N. (*Diadesmis*) *confervacea* Kütz. 6, 9, 10, 19, 26, 29, 30, 31, 41.
N. cryptocephala Kütz. 5, 6.
N. cuspidata Kütz. 5, 6, 13, 14, 22, 24, 29, 31, 39, 41.—Var. *ambigua* Cl. 4, 6, 15.—*cra-ticular* form. 6, 39.—Var. *Heribaudi* Perag. 6.
N. dicephala Ehr. 5, 6, 15, 19, 29.
N. (*Diploneis*) *elliptica* W. Sm. 19 (scarce).
N. (*Caloneis*) *fasciata* Lag. 6, 19, 21.
N. mutica Kütz. 5, 6, 9.—Var. *Cohnii* Hil. 41.
N. pseudobacillum Grun. 6, teste Cleve, 10, 41.
N. Pupula Kütz. 5, 6, 19, 36, 41.—Var. *bacillaroides* Grun. 31, 34.—Var. *rectangularis* Grun. 5.
N. rotacana Grun. 10.
N. sphærophora Kütz. 12, 27, 41. Var. *minor* (V. H. S. xii. 3). 4, 30, 39.
N. (*Caloneis*) *silicula* Ehr. var. *minuta* Grun. 10 (rare).
N. trinodis Sm. 5.
N. viridula Kütz. var. *rostellata* Cl. 6, 9, 12, 15, 19, 41.
Neidium affine (Ehr.). 5.—Var. *amphirhynchus* Cl. f. *minor*. 6, 41.
Nitszchia amphibia Grun. 41.
N. amphioxys E. 1, 5, 6, 10, 12, 14, 19, 21, 22, 30, 39, 40, 41.—Var. *amphilepta* Grun. 4.—Var. *elongata*. 10, 12, 31, 40, 41.
N. angustata Grun. var. *acuta*. 12.
N. Denticula Grun. 5 ?, 18, 19.
N. fasciculata Grun. 4, 5, 30.
N. linearis W. Sm. 5, 6, 7, 8, 9, 15, 19, 20, 24, 26, 28, 29, 34, 35, 37, 40.
N. littoralis Grun. 41.
N. Palea W. Sm. 6, 36.—Forma *major* V. H. 3, 41.
N. plana W. Sm. 27, 30, 40.
N. thermalis Grun. 41.
N. Tryblionella Hntz. var. *debilis*. 5, 9, 19, 32, teste Cleve.—Var. *levidensis*. 41.—Var. *Victoriæ* Grun. 6, 9, 41.
N. sigmoidea W. Sm. 30, 31, 40.
N. vitrea Norm. 31, 32.—Var. *salinarum*. 9.
N. sp.? resembles *N. margin-ulata*, but striæ obscure, sides parallel, with lanceolate acute ends, L. 0·065. B. 0·013. 24.
Pinnularia acrosphæria Bréb. 19, 21, 31, 40, 41.—Var? (Atl. xliii. 18). 9, 10, 17.
P. appendiculata Kütz. 5, 6.
P. borealis Kütz. 1, 5, 6, 14, 17, 19.
P. hemiptera Kütz. 40. Subcu-neate ends, area wide. Striæ 9–10.
P. interrupta Sm. 5, 6, 18.
P. latevittata Cl. 40, 41.—Var. *domingensis* Cl. 1, 5, 6, 24, 25, 27, 30, 40, 41.

Note.—The last mentioned species and variety are forms of *P. major*, separated by Cleve on account of the greater breadth of the longtitudinal band on the costæ. Dr. Cleve has identified these, in a letter, as occurring on slide 6. I am unable to distinguish these forms with certainty from *P. major*, and it is possible that the species referred to hereafter as the latter may be in part or wholly either *P. latevittata* or var. *domingensis* Cl. (Synops. Navic. Diat. pt. ii. p. 90).

P. major Kütz. 7, 8, 9, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 31, 33, 34, 35 ?, 37, 38.—Var. *subacuta* E. 17.—Var. *transversa* A. S. 9, 12, 13, 17, 22, 30.
P. mesolepta Ehr. 20.—Var. *stauroneiformis* Grun. 6, 8.
P. micrastauron E. 6, 10, 19, 25, 30.
P. molaris Grun. 5, 19.

P. paulensis Grun. (Atl. xliii. 8). 17 ?
P. stauroptera Grun. forma *parva* Grun. (V. H. vi. 6.). 4, 5.—Var. *interrupta* Cl. 5, 9, 15, 19, 29, 31, 34, 35, 37, 41.
P. subcapitata Greg. 36.
P. viridis Ehr. 5, 6, 7, 8, 9, 13, 15, 16, 19, 21, 22, 23, 24, 25, 29, 30, 31, 32, 34, 37, 38, 39, 40, 41.—Var. *commutata* Grun. 1, 6, 10, 13, 15, 17, 19, 24, 29, 30, 31, 37, 38, 41.—Var. *distinguenda* Cl. 5, 6, 7, 9, 13, 15, 16, 17, 19, 20, 25 ?, 30, 31, 34, 38, 40, 41.—Var. *intermedia* Cl. 4, 5, 7, 8, 9, 10, 13, 14, 15, 16, 17, 18, 19, 24, 25, 26, 29, 31, 35, 37, 38, 39.—Var. *fallax* Cl. 17 ?, 24, 25 ?
Stauroneis parvula Grun. 6 (rare), teste Cleve.
S. Phœnicenteron Ehr. 30, 31.
Surirella splendida Ehr. 5, 9, 12, 15, 29, 30, 39, 40, 41.
Synedra Ulna Ehr. 31, 41.—Var. *lanceolata* Ehr. 9, 12.—Var. *notata* Kütz. 12.

NOTES ON BRISTOL PLANTS.

By James W. White, F.L.S., and David Fry.

The following notes are in continuation of those published in this Journal for 1893, pp. 115–117, and for 1897, pp. 123–126. As before, new vice-comital records are distinguished by an asterisk, and vice-counties 34 and 6 by G. (W. Gloucester) and S. (N. Somerset) respectively :—

**Viola odorata* × *hirta* (*V. permixta* Jord.). Wood near Almondsbury, G. Bourton; Backwell; Murdercombe, near Mells; woods at Weston-super-Mare; hedges near Wookey Hole; Tickenham, S. This plant was first discovered in Somerset, at Weston-super-Mare, by Mrs. Gregory, and Mr. Beeby confirmed her opinion that it was of hybrid origin, remarking that the specimens sent him were not all precisely alike, as in some of them the *odorata* element preponderated, while others appeared to be nearer *hirta*. Shortly after Mrs. Gregory's discovery at Weston-super-Mare we found similar plants at the other localities noted above, frequently in considerable abundance. The N. Somerset stations are somewhat widely apart, and we suspect that this violet will prove to be generally distributed throughout that vice-county. One of the plants from Murdercombe which had white flowers Mr. Beeby considered was probably the *sub-odorata* form of *odorata* × *hirta* (*sepincola* Jord.), which is much rarer than the form nearer *hirta* (*permixta* Jord.). It produced a few partially abortive capsules, which Mr. Beeby says are sometimes characteristic of *sepincola*.

**Viola hirta* L. f. *lactiflora* Reich. A very beautiful plant with nearly pure white flowers, which occurs abundantly near Cadbury Camp, and on high ground between Brockley Combe and Cleve Combe, S.—*f. *rosea* Beeby. This form, in which the peculiar

colour of the flowers was well marked, was found by Mrs. Gregory very sparingly on the border of a wood at Christon, S. The Rev. E. S. Marshall states, in the recently published *Flora of Kent*, that he has grown *rosea* from seed, and that the characteristic colour of the flowers is retained in cultivation.—Var. b. *calcarea* Bab. Cleve-don; near Cleve Combe; Worle Hill, S. With reference to this variety, Mrs. Gregory, who found it on Worle Hill, has sent us the following note:—"The mature leaves are more glabrescent than in the small form of *hirta*, and the spur much shorter, not hooked, and more distinctly furrowed. These differences are as noticeable after a year's cultivation as when the plant was gathered."

Arenaria tenuifolia L. Mangotsfield and Pilning, G. On an embankment of the G.W.R. at Newton St. Loe, S. This, though fully established, can only be regarded as an introduction at the above localities, all of which are in close proximity to railways. The only station known to us in the Bristol district where it seems undoubtedly native is Pen Pole Point, G.

Hypericum dubium Leers. Near Dursley, and between there and North Nibley, G. A species of very rare occurrence in the Bristol Coal Field.

Trigonella purpurascens Lam. Very abundantly on Siston Common, G.

Vicia bithynica L. Roadside between Patchway and Winterbourne, G.; *C. Bucknall.*

Rubus rudis W. & N. Abundantly in Westridge Wood, Wotton-under-Edge, G.—**R. scaber* W. & N. and **R. viridis* Kalt. Growing together in Highbury Wood, near Hallatrow, S.; both plentifully, the former in great profusion. For an opinion on these plants we are indebted—as so often previously—to the unvarying kindness of the Rev. W. Moyle Rogers.

Potentilla verna L. Bourton Combe, S.

Epilobium lanceolatum Seb. & Maur. Near Abbots Leigh and Hallatrow, S.; *C. Bucknall.* Previously only known in N. Somerset at Brislington, near Bristol.

Antennaria dioica R. Br. Though this has been twice reported from Brean Down, S. (we believe correctly), the records, being unvouched by specimens, were not perfectly satisfactory, and we were therefore extremely pleased to receive from Mrs. Gregory some flowering stems of the *Antennaria* which she found last year (1898), very sparingly, on an exposed hill-side near Weston-super-Mare, thus conclusively establishing its claim to a place in the flora of Somerset.

Hieracium murorum L. var. e. *pellucidum* Laestad. (*fide* Mr. F. J. Hanbury). — *H. vulgatum* (Fr.) (*fide* Mr. F. J. Hanbury). Both plentifully in woods near Dursley, G. — *H. rigidum* Hartm. var. g. *tridentatum* (Fr.). On refuse from pennant quarries at Hallatrow, S.

Hypopitys Monotropa Crantz. Westridge Wood, near Wotton-under-Edge, G.; *C. Bucknall.* Near Weston-super-Mare, S.; *Mrs. Gregory.*

Atropa Belladonna L. A few plants in an unfrequented part of Leigh Woods, S. It seems as likely to be a native here as in many of the W. Gloucester woods, where it has always been regarded as truly indigenous. In July, 1897, we saw two or three plants of the *Atropa* growing on shingle by the shore of the Bristol Channel at Lilstock (Little Stoke), S. Somerset, the station being that recorded for it in the *New Botanist's Guide* by the late Rev. J. C. Collins, of Bridgwater.

Verbascum Blattaria L. Frequent near the G.W.R. at Brislington and Corston, S. Pointed out to us by C. Withers.

Orobanche major L. Several plants on broom, near Downend, G.; *Miss Roper*.

Mentha sativa L. var. b. *paludosa* (Sole). Plentifully by the river Chew at Compton Dando, S. In its extreme form this seems sufficiently distinct as a variety. The plants at Compton Dando agree well with the descriptions and figures by Sole and others.

Juncus maritimus Lam. Sparingly in Berrow Marsh, S. The occurrence here of this rush is interesting because, although there are old records of it for several spots on the Somerset coast, there are none for the above locality, and, as it had not been observed anywhere recently, though often searched for, was supposed to be probably extinct in the county until it was found at Berrow in the autumn of 1897.

Scirpus pauciflorus Light. Fairly abundant in Berrow Marsh, S.

Carex Leersii Schultz (var. *pseudo-divulsa* Syme). Wood near Dursley; embankment of railway near Sneyd Park, G.—*C. strigosa* Huds. Wood near Dursley, G.

Hordeum sylvaticum Huds. Westridge Wood, near Wotton-under-Edge; *C. Bucknall*. Woodmancote, near Dursley, G.

A QUESTION OF AUTHORSHIP.

By the Editor.

Some years ago* we ventured to call attention to the inconvenience likely to result from the publication of botanical papers in the Kew *Bulletin* without the names of the authors. We were informed in reply to this criticism that it was "impossible to assign the papers to single individuals"†; and although it seemed strange that circumstances at Kew should be in this respect different from those prevailing in any other quarter, there seemed no need for pursuing the subject, especially as the number of papers of botanical importance became inconsiderable. The publication in the "July–August" number of the *Bulletin* of an anonymous paper headed "Flora of British New Guinea," and containing descriptions of many novelties, suggests the desirability of recalling attention,

* Journ. Bot., 1893, 351. † l. c. 382.

in the interests of accuracy and convenience, to the difficulty presented by this method of publication.

This difficulty is one of the future rather than one of the present, for the name of each new species is followed by that of its author. It may be assumed, although it is not stated, that the enumeration of the known species in any given order containing novelties has been undertaken by the botanist whose name is attached to the new species. It is in the case of orders wherein no novelties occur that the difficulty is likely to be felt.

An example will explain our meaning. There is no novelty in *Scrophulariaceæ*, and therefore no such means of ascertaining who enumerated the species contained in it. Among these, without any indication of doubt, is *Veronica Lendenfeldii* F. Muell. But in the anonymous introduction to the paper we read: "A considerable number of specimens of *Veronica* have all been provisionally referred to *V. Lendenfeldii*, but it is possible that more than one species is concerned. It is an instance of one very variable species, or several very closely allied species."

If, as seems by no means improbable, this name has to be abandoned in favour of a new one, to whom will *V. Lendenfeldii* of the Kew Bulletin have to be attributed when it is cited as a synonym? It seems hardly likely that every identification in the list will ultimately prove correct, and in every such case this difficulty of accurate citation will be presented.

The matter is further complicated by the fact that the name of the editor of the *Bulletin* has never appeared, so that the same difficulty arises if it should be said that the names should be attributed to him. In one sense, the Director of Kew Gardens is probably responsible; but against this it may be urged that the presence of his name as editor on every other Kew publication makes it improbable that it would be absent from the *Bulletin*, if that could in any way be attributed to him. Nor is it easy to suppose that he is in any way, except indirectly, responsible for the notorious irregularities connected with the issue of the *Bulletin*.

It is therefore to be hoped that, in the interests of accuracy and of science, some information may be given on the point we have raised. If there are insuperable difficulties which prevent the authorship being stated, it would simplify matters if these were indicated. Papers in which various authors have co-operated are by no means infrequent, and we know of no instance in which the names of the writers are not assigned to the portions undertaken by each. As things stand at present, there is no means of ascertaining who is responsible for the names of which we have given an example, and therefore no possibility of citing the authority for them.

HIERACIUM CYMBIFOLIUM, sp. n.

By the Rev. W. H. Purchas, L.Th.

This Hawkweed has been known to me for at least the last fifteen years. I first noticed it on rocky (limestone) banks in the valley of the Manifold, near Wetton, the parish adjoining this, whence I brought it into my garden, where it continued year after year to maintain its characteristic form and texture of leaf; and I became more and more satisfied of its distinctness from other named British forms; but, as I had only met with it in one restricted spot, I did not think it would be wise to name and describe it until more should be known about it. I had, however, given plants of it to the Rev. W. R. Linton, who had become familiar with it in cultivation, and in July of last year he, with his brother the Rev. E. Linton and Mr. J. Cosmo Melvill, met with it in one of the Derbyshire dales near Miller's Dale, and they, after studying it, felt satisfied as to its claims to recognition. A few days afterwards Mr. W. Linton and myself found it in fair quantity on steep banks of the Wye Valley, a few miles below Buxton. There is therefore now no reason to abstain from naming the plant on account of insufficient examples of it having been seen, or of its occurrence in one limited locality only. I had sent examples of the plant to Mr. F. J. Hanbury, and they were seen in his herbarium by Dr. Elfstrand, who pronounced them to be a variety of *H. murorum* not yet recognized in Scandinavia.

Hieracium cymbifolium, sp. n. Leaves usually all radical, glaucous, thick and coriaceous, elliptic-oblong, truncate and with one or more spreading teeth on each side at the base; most frequently entire for the remainder of their outline, but occasionally with a few patent triangular teeth, rounded and mucronate at the tip, boat-shaped from the turning upward of their margins. Primordial leaves short and without mucro, the later ones in the centre of the rosette narrower and acuminate. Upper surface of the leaves glaucous and dull from numerous minute stellate appressed hairs; under surface with shaggy tomentum and white hairs, the margin fringed with numerous crisped hairs; petioles shaggy, usually longer than their leaves. Stem about 13 or 14 in. high, even and hairy, usually leafless or with only one small stalked leaf, simple for two-thirds or three-fourths of its length; primary branches one or two, nearly straight with a small bract at their origin; smaller branches and peduncles curved, clothed with more or less of white tomentum, and, more especially in the case of the peduncles, with numerous dark setæ. Heads about seven, short, thick, and remarkably truncate in bud. Phyllaries linear, not much folded over the ligules in bud, their points not meeting attenuated, as in *H. pachyphyllum*, but leaving an opening through which the ligules are seen, floccose, especially at their margins, and with a tuft of hair at their tips, clothed with numerous setæ and longish white hairs with thick black bases. Ligules often very numerous and expanding widely so that the opened flower-head is sometimes

1½ in. across, hairy externally in their lower part, of a full deep yellow. Styles deep yellow, becoming somewhat dusky.

Belonging to the same large group as *H. britannicum*, *H. stenolepis*, and others, it is distinguished from other British forms by the peculiar parallel-sided almost entire leaves and their boat-like curvature, by their singularly dull surface, and by the very short and truncate heads whose phyllaries are not long enough to meet in the centre of the head when folded over the ligules.

I had intended to suggest for this plant a name which should be expressive of the peculiarly dull aspect of the leaves, which is such as at once to catch attention; but, finding that this name has been already employed, I propose another suggested by the form of the leaves to which the Rev. W. R. Linton has called my attention.

RHODESIAN POLYPETALÆ.

By Edmund G. Baker, F.L.S.

The plants dealt with in the present paper were collected in December, 1897, and during 1898, by Dr. Frank Rand, some of whose novelties, with his interesting "Wayfaring Notes in Rhodesia," have already been published in this Journal,* and were presented by him to the National Herbarium. Previous botanical records for this region are very few. There is a botanical Appendix by Mr. R. A. Rolfe to Oates's *Travels in Matabeleland*, but the exact localities at which the plants were gathered are not given; and in the British Museum Herbarium there is a small collection made by Mr. G. A. K. Marshall in the neighbourhood of Salisbury in 1895 and 1896. In the Kew Herbarium there is the collection of Dr. Emil Holub.

Dr. Rand has kindly furnished the following notes on the physical features of the districts in which his plants were collected.

"The physical features prevailing in Rhodesia are very diverse, and defy any generalization; but a few remarks may be made upon the country in the immediate neighbourhood of Salisbury and of Buluwayo, and the strip of country traversed in passing from one town to the other.

"Buluwayo lies a little to the south of 20° S. lat., while Salisbury lies a little to the north of the 18th southern parallel. Both towns are situated at a height approaching 5000 ft. above the sea-level, and the country traversed between the two towns falls little below this average. The country, I suppose in consequence of this altitude, is wind-swept. It is customary to speak of the Rhodesian plateau, but this term is only relative, for in every direction the plateau is bitten into by the head waters of streams, those flowing to the north and to the west being affluents of the Zambesi, those

* Journ. Bot. 1898, pp. 141 and 345.

flowing to the east and to the south being affluents of the Sabi and of the Limpopo. In passing from Buluwayo to Salisbury one crosses many of these streams, some flowing in one direction, others in the other.

"The country generally has a firm red soil, but upon the actual watershed and hard by the soil is sandy. Soils of intermediate character abound, all highly fertile under cultivation. The shallow catchment areas which form the ultimate collecting grounds whence the streams arise have a bluish-black soil, with a subsoil of clay of varying thickness. Such soil shows many cracks, often of considerable size, and even large enough to admit the hoof of a horse. It is firm in the dry season, but boggy and treacherous in the rainy season. It is commonly known as vley ground. The large mountain masses are mostly of granite or gneiss; smaller masses may be of ironstone, sandstone, or other secondary rock. In passing from Buluwayo to Salisbury one crosses rise and hollow with rather monotonous frequency; the rise is always crowned with wood, the trees coming down the sides until the vley ground is reached; this they do not trench upon. On leaving the divide one invariably descends into broken and mountainous country, and in passing down one of the river valleys which descend from the plateau one reaches country of more tropical aspect. Thus one may frequently, in making such a journey, descend 1000 ft. and more in some thirty miles. There is little dense forest, the woods being mostly open, and their trunks of moderate size, 1–2 ft. in diameter; but in the valleys of the large rivers very fine timber is frequently seen.

"A frequently recurring feature of the country is seen in the titanic boulders of granite massed confusedly and picturesquely together. One's richest finds of specimens are frequently made in such places. Another curious feature often seen is the projection of some large crown of granite, tonsure-wise, through the soil."

Clematis Stanleyi Hook.

Hab. Salisbury, late Dec., No. 1.

In shape of leaf, &c., this is closely allied to a plant collected in Huilla by Welwitsch, No. 1221 b.

Ranunculus pinnatus Poir.

Hab. Salisbury, Dec., No. 79; July, No. 435. Buluwayo, May, No. 287. See note on this species in Journ. Bot. 1896, p. 88.

Nasturtium fluviatile E. Meyer.

Hab. Buluwayo, Jan., No. 21.

Apparently unrecorded for Tropical Africa.

Cleome maculata Szyszyl.

Hab. Shashi River, Jan., No. 22.

This plant has four fertile stamens and staminodia; in the *Flora Capensis* it appears as *Tetratelia maculata* Sonder.

Apparently unrecorded for Tropical Africa.

C. monophylla L.

Hab. Buluwayo, Dec., No. 73.

Pedicellaria pentaphylla Schrank.

Hab. Buluwayo, Jan., No. 23.

Mærua nervosa Oliv. var. flagellaris Oliv.
Hab. Buluwayo, Sept., No. 576.

Polygala virgata Thunb.
Hab. Salisbury, July, No. 437.
"A lax shrub as to habit, growing in moist places, preferably by running streams."—R. F. R.

P. erioptera DC.
Hab. Buluwayo, May, No. 290.
Closely allied to var. *angolensis* Chodat.

P. hottentotta Presl.
Hab. Buluwayo, Dec., No. 14. Salisbury, Sept., No. 599.

Polycarpæa corymbosa Lam.
Hab. Buluwayo, May, No. 350.

Bergia decumbens Planch.
Hab. Buluwayo, No. 333 and No. 337, p. p.

Monotes africana A. DC. var. glabra Oliv.
Hab. Salisbury, in fruit, July, No. 557.

Sida capensis E. & Z.
Hab. Buluwayo, Dec., No. 30; May, in flower and fruit, No. 292.

Abutilon fruticosum Guill. & Perr.
Hab. Buluwayo, Dec., No. 27.

A. hirsutissimum Moench (*A. asiaticum* Don).
Hab. Buluwayo, Dec., No. 7.

Pavonia clathrata Masters.
Hab. Mochudis, in flower and fruit, May, No. 291.
This is identical with *Luederitzia pentaptera* K. Schum. in Pl. Marlothianæ, p. 45, t. vi. (1888).

Hibiscus Trionum L.
Hab. Buluwayo, Dec., No. 6. Also Dammaraland, *T. G. Een.*

H. pusillus Thunb.
Hab. Buluwayo, Jan., No. 25. Between Natal and Upper Zambesi, *Rev. H. Day.*

H. cannabinus L.
Hab. Buluwayo, in fruit and flower, May, No. 293.

H. micranthus L. forma macranthus.
Hab. Salisbury, Sept., Nos. 438 & 591.
Flowers considerably larger than in the type.
"Flowers and fruits before leaves appear. Stems mostly very short, but sometimes long."—R. F. R.

Hibiscus (Ketmia) **rhodesicus,** sp. nov. Caulis erectus herbaceus flexuosus ± pilosus; foliis brevissime petiolatis fere ad basin 3–5-partitis, lobis angusti-oblongis vel lanceolato-oblongis serratis supra glabris subtus sparse stellato-pilosis et pallidioribus; stipulis angustis plerumque divaricatis quam petiolis longioribus; floribus axillaribus pedunculatis et apicem versus subcongestis; pedunculis quam foliis brevioribus supra medium articulatis; involucri phyllis pluribus linearibus quam calyce subtriplo brevioribus; calyce ad

medium vel infra in lacinias triangulari- vel ovati-lanceolatas diviso; corolla 2–2½-plo calycem superante in statu sicco sulphurea; capsula acuta, seminibus non gossypinis. *H. articulato* Hochst. valde affinis.

Hab. Buluwayo, in flower and fruit, Dec., No. 28.

Differs from *H. articulatus* Hochst. in its broader calyx-lobes without the strong median nerve, and in the veining and serration of the leaves.

Stem erect, herbaceous, flexuous, especially towards the summit pilose. Leaves deeply 3–5-lobed, when 5-lobed middle lobes are longest (middle lobe 6–7 cm. long), lobes serrate, acute or subacute, leaves very shortly petiolate, petiole 2–3 mm. long. Stipules linear, divaricate, longer than the petioles. Flowers axillary, towards the summit more or less congested. Lowest peduncle on specimen 5·3 cm. long, articulated about 5 mm. from apex. Bracts of involucre 7 or 8, narrow, about 3 mm. long. Sepals ovate-lanceolate or triangular-lanceolate, much longer than the bracts. Capsule hairy at margin, pointed, about same length as sepals. Seeds puberulous.

H. TERNATUS Masters.

Hab. Buluwayo, Jan., No. 69.

DOMBEYA ROTUNDIFOLIA Harvey, forma.

Hab. Salisbury, July, No. 568.

"A tree 20 ft. or so in height, collected near the grand stand of the Salisbury racecourse."—R. F. R.

In the *Flora Capensis*, i. p. 221, *D. rotundifolia* is described as a divaricately branched rigid shrub.

MELHANIA PROSTRATA Burch. forma LATIFOLIA.

Hab. Buluwayo, Dec., No. 24; compared at Kew with *Burchell* No. 2153. *Wilms* No. 121 is very similar; it comes from the Transvaal, District Lydenberg.

Leaves broader than in the type.

Melhania Randii, sp. nov. Caules breves breviter canescentes vel flavescenti-tomentosi; foliis petiolatis oblongis basi rotundatis apice rotundatis et mucronatis vel submucronatis, margine integris; stipulis lanceolato-linearibus; pedunculis axillaribus, apice bifurcatis vel trifurcatis et 2–3-floris quam foliis longioribus vel brevioribus; involucri foliolis lanceolato-linearibus quam sepalis brevioribus; sepalis lanceolatis; capsula subglobosa hirsuta et punctato-tuberculata, loculis ± 5–6-spermis.

Hab. Salisbury, in flower and fruit, Aug., No. 439.

Stems 6–10 cm. long, covered with a close flavescent or canescent tomentum. Leaves oblong, petiolate, base rounded, apex rounded and mucronate or submucronate, covered with a close flavescent or canescent tomentum, lamina 2–3·2 cm. long, 7 mm. to 1 cm. broad, petiole 2–5 mm. long. Stipules narrow, lanceolate, often about 4 mm. long. Peduncles 2–3-flowered, shorter or longer than the leaves, axillary. Bracts of epicalyx narrow lanceolate, shorter than sepals. Sepals lanceolate-acuminate, about 8–9 mm. long, striate. Petals slightly longer than the sepals. Ovary hairy. Sterile stamens

strap-shaped. Carpels hairy externally, loculi ± 5–6-seeded, carpels 7–8 mm. long.

Hermannia depressa N. E. Br.
Hab. Salisbury, July, No. 569. Buluwayo, May, No. 332.

H. viscosa Hiern.
Hab. Buluwayo, May, No. 295.

Waltheria americana L.
Hab. Buluwayo, Dec., No. 53.

Triumfetta Mastersii Baker fil.
Hab. Salisbury, Aug., No. 440; in flower and young fruit, Sept., Nos. 592 & 592 *bis*.

Corchorus serræfolius Burch.
Hab. Buluwayo, Dec., No. 8.
Wilms No. 106, from Transvaal, is the same.
A plant in the National Herbarium, gathered by Rev. W. Greenstock at Pilgrim's Rest, Transvaal, is var. *linearifolius* Szyszyl.

Sphedamnocarpus pruriens Planch. ?
Hab. Buluwayo, May, No. 431 (in fruit).
"A climber. The small needle-like hairs upon the fruit come off as in case of pods of *Mucuna pruriens*. They caused considerable irritation. My hands tingled for several days after handling."
This is the *S. pruriens* Rolfe in Oates, Matabeleland, ed. 2, p. 396. It seems somewhat different from the type of *S. pruriens*; the leaves are not nearly so silvery beneath, &c.

Monsonia biflora DC.
Hab. Buluwayo, Dec., No. 19.

M. Burkeana Planch.
Hab. Salisbury, in flower, Aug., No. 441.

Oxalis corniculata L. var. β stricta.
Hab. Buluwayo, May, No. 296.

Thamnosma africanum Engl. var. rhodesicum. Stems erect, virgate, more robust than the type, about 30–40 cm. long. Leaves rather thick, glandular, simple or dissected, when dissected middle lobe longest, margin subentire or crenulate.
Hab. Buluwayo, in flower and young fruit, Jan., No. 83; in fruit only, May, No. 297.
The type comes from Otyjïmbinque, *Marloth* No. 1413; it has also been collected in Great Namaqualand by Dr. Hans Schinz. Var. *crenatum* Engler, Notiz. Bot. Gard. Berl. ii. 26, is founded on a plant from the Transvaal collected by Dr. Wilms, No. 202. It is also in the Kew Herbarium from the Transvaal, collected by Dr. W. G. Atherstone. The Rhodesian plant is intermediate between the type and this variety.
The distribution of this genus is interesting. Two species are North American, *T. montana* Torrey & Fremont and *T. texana* Torrey; a third species, *T. socotrana*, was found by Dr. Balfour in the hills of Socotra; a fourth, *T. Hirschii* Schwf., is Arabian.
The fruit of *T. africanum* has not the long stipe of the typical North American plant on which the genus was founded. The

structure of the capsules is more nearly related to *Rutosma*, which is figured by Gray (Sprague & Gray, Gen. ii. 143, t. 155). Bentham & Hooker reduce it to *Thamnosma*.

Ximenia americana L. var.
Hab. Buluwayo, May, No. 423.

"A thickset woody bush. Fruit the so-called Kafir plum. The fruit is bright salmon-colour when ripe, pleasant to taste; stone large, somewhat like that of an olive. Ripe fruit about size of an olive. The stone contains a large fleshy kernel."

This differs from the type in having smaller flowers, with petals (± 5 mm. long) not so much bearded. It will probably have to be referred to var. *microphylla* Welwitsch, although the leaves in some cases reach an inch in length.

Turræa Randii, sp. nov. Frutex ramis adultioribus glabris junioribus puberulis; foliis breviter petiolatis, ovatis, basi cuneatis, apice obtusis, margine integris interdum undulatis utrinque breviter tomentosis, subtus pallidioribus, nervis lateralibus 12–14 subparallelis interdum bifurcatis; floribus in fasciculos axillares confertis, pedicellis floribus fere æquilongis vel brevioribus; bracteis lanceolatis sessilibus; calyce campanuliformi breviter 5-dentato pubescente; petalis 5 quam calyce multo longioribus subspathulatis vel oblanceolatis breviter mucronatis; staminibus 10, antheris apice mucronatis; stylo quam ovario multo longiore, tubum stamineum superante, infra stigma urceolato-incrassato, flava; ovario sessili, libero, subgloboso, extus glabro, 8-loculari. *T. nilotica* Kotschy & Peyritsch valde affinis.

Hab. Salisbury, No. 562; in flower, July.

Differs from *T. nilotica* Kotschy & Peyritsch (Pl. Tinneanæ, 12, t. 6) in the following points.—(a) The flowers appear before the leaves. (b) Flowers and leaves are larger; the staminal tube in *T. Randii* is 1 cm. long; the leaves reach a length of 16 cm. (c) The dilatation below the stigma is broader and shorter. (d) The ovary is 8-locular.

A shrub, the older branches with a grey cortex, glabrous, the younger branches puberulous. Leaves ovate, base cuneate, apex obtuse, lamina 12–16 cm. long, 6·5–8 cm. broad, petioles about 1 cm. long, leaves on both sides covered with a fine tomentum, paler coloured below. Flowers in axillary fascicles, often about 8–10 flowers in a fascicle, appearing before the leaves. Pedicels sometimes nearly 1 cm. long, but generally shorter, puberulous. Calyx 2–3 mm. long. Petals ± 1·4 cm. long, hairy externally. Staminal tube about 1 cm. long, hairy internally below the insertion of stamens. Style including stigma nearly 2·5 cm. long. Stamens 10, included, or just the very tips of the anthers showing above the staminal tube. Anthers mucronate at apex. Within the staminal tube two or three ants were generally found. Ovary glabrous externally, 8-locular.

Ekebergia arborea, sp. nov. Arbor alt. 5–7 met. (F. Rand in schedulis); foliis imparipinnatis 4-jugis, foliolis oppositis vel suboppositis, oblique ellipticis vel ovalibus vel late oblongo-ovatis,

brevissime petiolatis interdum subsessilibus, basi inæquali, apice breviter cuspidatis vel rotundatis, integris, supra glabris viridibus, subtus pallidis glaucis, papyraceis, nervis lateralibus utrinque 6–8 inconspicuis; paniculis longiuscule pedunculatis, foliis dimidium circiter æquantibus, pedunculis glabris; calycis segmentis acutis vel subacuminatis; petalis 5 carnosulis oblongis obtusis extus pubescentibus; tubo stamineo urceolato quam petalis breviore superiore parte extus et intus hirsuto; antheris exsertis oblongis; stylo crasso stigmate subgloboso, tubum subæquante; ovario basi cum disco concreto 2-loculari. Ad *E. benguelensem* Welw. arcte accedit.

Hab. Salisbury, in flower, Sept., No. 612.

A handsome tree of from 5 to 7 metres high, very ornamental, and considered by Dr. Rand as deserving of cultivation. Branches glabrous, with a reddish brown cortex. Leaves imparipinnate, 4-jugate, 10–15 cm. long; leaflets oval or ovate, green above, whitish below, somewhat similar to the leaflets of *E. benguelensis* Welw.; petiolules very short, sometimes the leaflets are subsessile; lamina ± 4 cm. long, 2·5 cm. broad. Panicles of flowers nearly half as long as the leaves; rachis glabrous (in *E. benguelensis* Welw. the rachis is not glabrous). Petals oblong, obtuse, pubescent externally, ± 5 mm. long. Anthers exserted. Style rather thick; stigma subglobose, hardly as long as staminal tube. Fruit not seen.

Allied also to *E. discolor* O. Hoffm. in *Linnæa*, xliii. 123. *E. Buchanani* Harms in Engler, Bot. Jahrb. xxiii. 164, from Nyassaland, is described by the author as having leaflets 10–15 cm. long.

Catha edulis Forsk.

Hab. Salisbury, in fruit, July, No. 567.

Gymnosporia senegalensis Loes. var. inermis.

Hab. Buluwayo, May, No. 298.

G. senegalensis Loes. var. b. spinosa.

Hab. Buluwayo, shrub, May, No. 413.

Seems closely allied to Welwitsch No. 1348, from Huilla, Angola.

Zizyphus mucronata Willd.

Hab. Buluwayo, Dec., No. 9.

Rhoicissus erythrodes Planch.

Hab. Salisbury, July, No. 443.

Cissus cymosa Schum.

Hab. Salisbury, Sept., No. 606.

Heeria insignis O. Kuntze, var. reticulata. Arbor foliis oblongis vel oblongo-lanceolatis vel oblongo-ovatis subtus argenteo vel flavescenti-tomentosis obtusis vel obtusiusculis mucronatis, nervis lateralibus quam in typo paucioribus reticulato-venosis; petalis oblongis obtusis quam sepalis longioribus, sepalis ovatis externe tomentosis.

Hab. Buluwayo, in flower, Jan., No. 64; in fruit, May, No. 307.

Leaves 6–8 cm. long, 2–3 cm. broad, petiole ± 8 mm. Petals ± 2 mm. long.

"A handsome tree of moderate size. The lower branchlets droop, as do also the fruit-bearing twigs, so that the berries are accessible from below—probably quadrupeds, not birds, disseminate the seed, I suspect from this circumstance."—R. F. R.

Differs from type in having lateral nerves wider apart, being strongly reticulate, veined underneath, and petals $1\frac{1}{2}$–2 times, not $3\frac{1}{2}$–4 times longer than calyx.

Anaphrenium crassinervium Engler in Pl. Marloth. 37, differs in several points. The leaves are closer and of a different shape, and the petiole is shorter.

Rhus Welwitschii Engler, var. angustifoliola. Foliis subtus dense fulvo-tomentosis, foliolis oblongis vel angusti-oblongis vel oblongo-ellipticis quam typo angustioribus brevissime apiculatis; paniculis folia superantibus dense fulvo-tomentosis, ramulis secundariis spiciformibus densifloris, floribus sessilibus.

Hab. Buluwayo, in flower, Jan., No. 97.

Differs from type especially in narrower leaflets and longer petiole.

Leaflets 4–6·5 cm. long, 1–1·6 cm. broad, petiole ± 1·5 cm. long. Petals 1·5 mm. long.

Differs also in shape of leaflets from *R. apiculata* Engler in Bot. Jahrbuch, xxiv. 502.

R. villosa L. fil.

Hab. Buluwayo, Jan., No. 65. Salisbury, July, No. 560.

R. tenuinervis Engler, var.

Hab. Buluwayo, May, No. 306.

Has much shorter inflorescence than the type.

Rhus trifoliolata, sp. nov. Ramulis teretibus glabris vel glabriusculis; foliis coriaceis trifoliolatis, petiolo semiterete instructis, foliolis anguste linearibus integerrimis vel undulatis concoloribus acutis subtus reticulato-venosis; paniculis elongatis diffusis axillaribus et terminali quam foliis longioribus, ramulis gracillimis; bracteolis parvis subulatis, pedicellis tenuibus; alabastris globosis subæquilongis; calycis segmentis brevibus obtusis; petalis obtusis quam sepalis paullo longioribus. Drupæ desunt.

Hab. Buluwayo, in flower, Dec., No. 66.

Branches terete, glabrous or towards extremities puberulous, with a dark reddish brown or subcinereous cortex. Leaves trifoliolate, petiolate (petiole 1–1·5 cm. long), leaflets narrow linear, acute, coriaceous, margin undulate, lateral veins reticulating, to the unassisted eye apparently glabrous, but under a lens seen to be finely puberulous, terminal leaflets often 5–6 cm. long by ± 3·5 mm. broad, lateral leaflets shorter—the leaflets are sessile, not petiolulate. Panicle diffuse, leafy. Flowers small, numerous. Sepals short. Petals longer than the sepals, obtuse, ± 1 mm. long.

Allied to *R. Wilmsii* Diels, *R. gracillima* Engler, and *R. Dregeana* Sonder.

R. lancea L.

Hab. Buluwayo, July, No. 444; May, No. 302; fruit only, May, No. 304.

Medium-sized tree, willow-like in habit. Rather broader in leaflet than in South African specimens.

"This species of *Rhus* usually grows beside water-courses, and is darker in the leaf—this specimen was a hundred yards away, and lighter in leaf."—R. F. R.

Lotononis Leobordea Benth.
Hab. Buluwayo, May, Nos. 308 & 309.
"Forms woolly patches closely appressed to the ground."—R. F. R.

Listia heterophylla E. Mey.
Hab. Buluwayo, May, No. 312.

Crotalaria cephalotes Steud.
Hab. Salisbury, in fruit, July, No. 463 (partly).

C. laburnifolia L.
Hab. Near Shashi River, Jan., No. 45.

C. podocarpa DC.
Hab. Buluwayo, Jan., No. 43.

Indigofera Schimperi Jaub. & Spach, forma.
Hab. Buluwayo, Dec., No. 39.

I. goniodes Hochst.
Hab. Buluwayo, Jan., No. 38.

I. hilaris E. & Z.
Hab. Salisbury, Aug., No. 445.

I. heterotricha DC., var.
Hab. Buluwayo, Dec., No. 62.

Tephrosia radicans Welw. var. rhodesica. Leaflets generally seven, rather broader than in the type. Legume broader than type.
Hab. Buluwayo, in flower and fruit, Dec., No. 52.

T. lurida Sond. ex descript.
Hab. Buluwayo, early Jan., No. 41; Dec., No. 51.
T. angustissima Engler is an allied plant, which I only know from the description.

Mundulea suberosa Benth.
Hab. Buluwayo, Dec., No. 77.

Lessertia stipulata, sp. nov. Suffruticosa erecta, caule sparsim albo-strigoso; foliis 8–12-jugis, foliolis ovatis vel obovatis vel oblongo-ovatis apice mucronulatis oppositis vel interdum alternatis, nervis primariis præcipue albo-hirtis, petiolulis brevibus; stipulis magnis ovatis subamplexicaulibus acutis; racemis folio longioribus sæpe 12–20-floris, pedicellis quam calyce brevioribus, bracteis linearibus; sepalis acutis vel subacuminatis; vexillo in statu siccitate purpureo quam carina paullo longiore vel subæquilongo; leguminibus (immaturis tantum) rectis vel subrectis stipitatis polyspermis glabris compressis.

Hab. Salisbury, in flower and young fruit, Sept.

Stem herbaceous, woody below, thinly albo-strigose, ± 30 cm. long. Leaflets ovate, or obovate, or oblong-ovate, very sparingly hairy, 8–12-jugate, opposite or occasionally alternate, rachis 8–10 cm.

long, petiolule under a millimetre, leaflets 6–9 mm. long, 4–5 broad. Stipules conspicuous, subamplexicaul, ovate, pointed, often about 1·7 cm. long. Peduncles longer than the leaf, laxly racemose, often about 12–20-flowered, occasionally fewer-flowered, pedicels shorter than the calyx. Calyx upper teeth short, lower longer pointed. Standard curved upwards, about 9 mm. long (purplish in dried specimens). Wings and keel about 8 mm., claw of keel about 3 mm. long. Keel blunt. Style only very slightly bearded. Ovary stipitate. Legume straight or nearly straight, 5–6 times as long as broad (in unripe legumes), many-seeded.

Belongs to § *Stenolobæ* of the *Flora Capensis*: noticeable on account of its conspicuous stipules.

Sesbania punctata DC.
Hab. Buluwayo, July, No. 448.

Diphaca trichocarpa Taubert, ex descript.
Hab. Buluwayo, Dec., No. 31.

Stylosanthes erecta P. B.
Hab. Buluwayo, May, No. 310.

Zornia tetraphylla Michx.
Hab. Buluwayo, Jan., No. 61.

Erythrina tomentosa Br.
Hab. Salisbury, July, No. 462.
The inflorescence appears before leaves.

Vigna vexillata Benth.
Hab. Salisbury, Sept., No. 589.

V. marginata Benth. ex descript.
Hab. Salisbury, No. 461.

Dolichos tricostatus, sp. nov. Caulis erectus confertim rufo-pubescens vel subtomentosus; foliis breviter petiolatis trifoliolatis, foliolis lanceolatis vel oblongo-lanceolatis, petiolulis foliolorum lateralium brevissimis subtus 3-nerviis apice mucronatis basi cuneatis utrinque pubescentibus; pedunculis axillaribus 1-floris; calycis strigoso-pubescentis dentibus angusti-lanceolatis acuminatis inæqualibus, inferiore quam ceteris longiore; vexillo obovato curvato, alis ovatis vel oblongo-ovatis unguiculatis auriculatisque, carina curvato; ovario sparse pubescente pluriovulato, stigmate capitato. Legumen deest.

Hab. Buluwayo, in flower, Jan., No. 82.

D. Schweinfurthii Taubert, *D. bongensis* Taubert, and *D. trinervatus* Baker also have 3-costate leaves.

Stem erect, covered above with a rufous tomentum. Leaves pinnately trifoliolate, pubescent, leaflets lanceolate or oblong-lanceolate, usually apiculate, 3-ribbed, 6–7 cm. long, the central leaflet rather larger than the lateral ones, petiole pubescent, 6–7 mm. long, central petiolule about the same length, lateral petiolules 2–3 mm. long. Flowers axillary, peduncles slender, varying in length from 4 mm. to 1 cm. Calyx hairy, teeth narrow lanceolate-acuminate. Standard curved, about 1 cm. long, keel about the same length. There are no legumes on the Rhodesian

specimen, but this plant appears to be identical or very closely allied to Welwitsch No. 4126, from Huilla, Angola.* The legumes of this Welwitsch plant are about 4 cm. long, shortly pubescent, and 4–6-seeded. It has been considered a close ally of *D. stipulosus* Welw.; it is, however, perfectly distinct.

D. STIPULOSUS Welw. var. RANDII.

Hab. Salisbury, Dec., No. 80.

Stem erect, ± 20 cm., that is, considerably taller than the type. Leaves trifoliolate, central leaflet about 7–8 cm. long, acute, main petiole about 1 cm. long, patently hairy. Stipules about 1·5 cm. or sometimes shorter, strongly veined. Flowers rather larger than in the type. Standard oblong, ovate, clawed, curved, 2·3 cm. long. Wings rather noticeable on account of long claw. Sepals narrow lanceolate-acuminate, patently hairy.

This plant is very closely allied to Welwitsch No. 2221, from distr. Pungo Andongo, Angola, which Mr. Hiern considers a taller form of *D. stipulosus* Welw.

RHYNCHOSIA PUBERULA Harv.

Hab. Buluwayo, early Jan., No. 46.

Apparently unrecorded for Tropical Africa.

R. MINIMA DC.

Hab. Salisbury, Aug., No. 454.

R. RESINOSA Baker.

Hab. Salisbury, July, No. 457.

"A climber straggling over trees and rocks. Sweet-scented. Calyx covered with sticky, glittering, glandular hairs."—R. F. R.

R. ANTENNULIFERA Baker (*Eminia antennulifera* Taubert).

Hab. Salisbury, July, No. 453.

Leaves required.

ERIOSEMA POLYSTACHYUM Baker.

Hab. Buluwayo, Jan., No. 48.

E. CAJANOIDES Hook. fil.

Hab. Buluwayo, Jan., No. 49 (a form with leaflets narrower than usual); fruit only, July, No. 447.

E. OBLONGUM Benth.

Hab. Salisbury, in flower and fruit, Sept., No. 590.

Originally described from Aapjes River, *Burke & Zeyher*: occurs also in Nyassaland.

E. INSIGNE O. Hoffm., vel affinis.

Hab. Salisbury, Aug., No. 458.

Dr. Rand's plant agrees with the above (which I only know from description) in many points. I append a short description of the Rhodesian plant, especially of the leaves, which were wanting in Dr. Hoffmann's type from Malange.

"A low shrub, very abundant around Salisbury. First flowers appear before new leaves clustered around root, but later flowers appear upon the stem along with leaves."—R. F. R.

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* *Confer* Hiern in Welw. Cat. i. 264.

Leaves trifoliolate, leaflets more or less silky, tomentose on both sides, especially when young, terminal leaflet obovate or broadly oblanceolate, larger than the others, 5–6 cm. long, ± 2·8 cm. broad at broadest point, lateral leaflets ± 3·2 cm. long, possibly these measurements may require some alteration when a greater range of leaf material has been seen; main petiole short, ± 3·4 mm. Racemes axillary, many-flowered. Sepals covered with grey silky hairs, lanceolate-acuminate, lowest sepal longest. Standard and keel about 1·5 cm. long, nearly same length, covered with grey hairs externally. Legume obliquely ovate-oblong, grey-pubescent externally, ± 2 cm. long, 1·2 cm. broad, generally 1-seeded. Style hairy below, glabrous above.

Peltophorum africanum Sond.
Hab. Buluwayo, Nos. 10 & 318, p. p.
"Also abundant in British Bechuanaland."—R. F. R.

Cassia didymobotrya Fres.
Hab. Buluwayo, in flower, July, No. 451.

C. arachoides Burch.
Hab. Buluwayo, Nos. 3 & 42.

Bauhinia fassoglensis Kotschy.
Hab. Buluwayo, Dec., No. 78.

B. Petersiana Bolle, ex descript.
Hab. Shashi River, Dec., No. 2.

Copaifera Mopane Kirk.
Hab. Buluwayo, Dec., No. 12.
"Exists in large forest masses. Timber not touched by termites. Terebinthaceous smell. Slightly gummy."—R. F. R.

Brachystegia Randii, sp. nov. Arbor, ramulis junioribus extremitates versus ferrugineo-pubescentibus; foliis petiolo rhachideque ferrugineo vel cinereo-pubescente; foliolis oppositis 4-jugis brevissime petiolulatis oblique oblongis vel oblongo-lanceolatis vel ovato-oblongis, apice leviter emarginato ab apice rhachidis ad basin decrescentibus subcoriaceis; racemis brevibus densiusculis; prophyllis oblongo-ovatis externe ferrugineo-subtomentosis; sepalis 2, angusti-lanceolatis; filamentis glabris; ovario distincte stipitato, 5–6-ovulato, ferrugineo-hirsuto; stylo superne glabro; legumine externe ferrugineo-pubescente.

Hab. Salisbury, Nos. 610 & 611.

"Both the above specimens were collected in September, 1898, when the tree was bearing the previous season's fruit, and just coming into flower again."—R. F. R.

Allied to *B. appendiculata* Benth., *B. Oliveri* Taubert, and *itoliensis* Taubert.

Branchlets towards the extremities ferruginous pubescent. Leaves 4-jugate, rarely 3-jugate, rachis of leaf 5–6 cm. long, ferruginous pubescent. Leaflets obliquely oblong or oblong-lanceolate, terminal pair generally larger than rest, ± 4 cm. long, 1·6 cm. broad, petiolule very short, lamina subcoriaceous, slightly hairy above and below, especially on the midrib. Raceme

spiciform, densely flowered. Bracts ovate, sepal-like, ferrugineous tomentose externally. Sepals narrow lanceolate (thus differing from *B. appendiculata* Benth.), rather over 2 mm. long. Anthers about 1 mm. long. Ovary hairy, stipitate, style hairy at base, glabrous above. Legume 5–6·5 cm. long, about 2 broad. The legume examined contained only a single ripe seed, and a curious external projection opposite the point of attachment.

"Native name, *Musasa*. A frequent tree of good size upon the Mashonaland hills. The spring leaves show splendid ranges of colour, yellow, salmon-pink, and red being often seen, forming quite a feature in the landscape. The inner bark used by natives for twine and rope. They prepare it very quickly and readily by rubbing between the palms of the hands. The tree is very plentiful, and yields large quantities of a gum, deep red in colour, and very rich in tannin. I think it should be of some commercial value. Flowers sweet-scented."—R. F. R.

DICROSTACHYS NUTANS Benth.

Hab. Buluwayo, Jan., No. 35.

ACACIA SEYAL Delile.

Hab. Buluwayo, Jan., No. 72.

A. SEYAL Delile, var. MULTIJUGA Schweinf.

Hab. Buluwayo, Dec., No. 37.

PARINARUM CAPENSE Harv.

Hab. Salisbury, Sept., No. 620.

"Grows in tufted patches of a few inches in height in ground bordering on vleys."—R. F. R.

P. MOBOLA Oliver.

Hab. Salisbury, No. 548; also No. 630, in flower, Sept.

RUBUS RIGIDUS Smith.

Hab. Salisbury, July, No. 464.

VAHLIA CAPENSIS Thunb.

Hab. Buluwayo, May, No. 334.

V. CAPENSIS Thunb. var. LINEARIS E. Meyer.

Hab. Buluwayo, Dec., No. 63. Also in the National Herbarium from Pilgrim's Rest, Transvaal, *Rev. W. Greenstock.*

KALANCHOE PANICULATA Harvey.

Hab. Buluwayo, May, No. 321.

K. ROTUNDIFOLIA Haw.

Hab. Buluwayo, May, No. 319.

K. GLANDULOSA Hochst. var. RHODESICA. "Abundant upon large ant-heaps. Flowers of a rich orange colour."—R. F. R.

Stem erect, 35 cm. high, possibly more, especially near the inflorescence hairy. Inflorescence paniculate-cymose. Flowers deeper colour than in the type, which is described as having "pale yellow flowers." Sepals externally glandular hairy, ± 6–7 mm. long, shorter and more deeply divided than in the type. Corolla sparsely glandular hairy, lobes ± 5 mm. long, ovate or obovate, mucronate. Carpels slender, narrowed into styles.

Hab. Salisbury, in flower, July, No. 465.

In *K. glandulosa* Hochst. var. *benguelensis* Engler, the flowers are pale yellow; the sepals also are different.

The above variety may subsequently be found worthy of specific rank.

K. brachycalyx A. Richard is an allied plant. The var. *Jemensis* Deflers I only know from the description. Dr. Schweinfurth considers *K. lanceolata* Pers. and *K. glandulosa* Hochst. as synonymous.

MYROTHAMNUS FLABELLIFOLIA Welw.

Hab. Gwelo District, Dec., No. 5. Fort Gibbs, ♂ & ♀, Sept., in flower, Nos. 600 & 601.

TERMINALIA SERICEA Burch. var. ANGOLENSIS Hiern.

Hab. Buluwayo, May, No. 416.

Terminalia Randii, sp. nov. Ramulis ad nodos spinas 2 acutas ferentibus; foliis parvis fasciculatis, coriaceis, oblanceolatis brevissime petiolatis vel subsessilibus, nervis lateralibus 3–4 subarcuatis tenuibus, margine integris, apice rotundatis et apiculatis, junioribus strigoso-pubescentibus, adultioribus glabrescentibus vel subglabrescentibus; floribus subsimilibus iis *T. Rautanenii* Schinz, racemis quam foliis longioribus, tubo calycino fusiformi, limbo breviter campanulato 5-fido, segmentis acutis, externe glabris interne hirtis; staminibus quam calyce longioribus; fructibus late ovatis pedunculatis, pericarpii alis quam fructus latioribus apice confluentibus basi late cuneatim angustatis.

Hab. Buluwayo, in flower and fruit, May, No. 325.

A plant collected by Dr. Holub in Leshumo Valley, Zambesiland, may be identical with the above.

Branchlets with a rather dark cortex, spinous at the nodes, spines 9–11 mm. long. Leaves generally in rosettes, lamina coriaceous, oblanceolate, ± 2 cm. long, greatest breadth 6–8 mm., sloping to the base, and either very shortly petioled or subsessile. Flowers in racemes which are longer than the leaves. Peduncle strigoso-pubescent. Calyx-segments triangular, acute, glabrous externally. Stamens longer than the calyx (about 1·5 mm. long). Style filiform, twisted, glabrous. Fruit reddish purple when ripe, broadly ovate, ± 2 cm. long, 1·5 cm. broad.

Another spinous species is *T. spinosa* Engler in Pl. Ost Africa, c. 294.

COMBRETUM OATESII Rolfe.

Hab. Buluwayo, No. 322. Salisbury, Sept., Nos. 466 & 466 *bis*.

C. GLOMERULIFLORUM Sonder.

Hab. Buluwayo, No. 585; Sept., No. 584, is probably a slightly tomentose form of this.

C. APICULATUM Sonder.

Hab. Buluwayo, early Jan., No. 33.

Combretum rhodesicum, sp. nov. Ramis inermibus teretibus, cortice cinereo; foliis oppositis vel suboppositis, breviter petiolatis, oblongis vel ovato-oblongis, margine integris, apice obtusis vel subacutis, utrinque lepidotis, nerviis primariis strigoso-pubescentibus, nerviis lateralibus sæpissime 4 arcuatis; spicis axillaribus sub-

capitatis, densis; alabastris ovoideis; calycis campanulati extus pubescentis, segmentis 4, acutis vel subacuminatis; petalis luteis glabris; staminibus 8, filamentis glabris, exsertis; stylo filiformi; fructibus quadrialatis ellipticis, alis scariosis corpore lanceolato sublatioribus, transverse striatulatis, pallide brunneis.

Hab. Buluwayo, in flower and fruit, Sept., Nos. 582 & 583.

Allied to *C. ligustrifolium* Engler & Diels, *C. glomeruliflorum* Sonder, and *C. erythrophyllum* Sonder.

Branches terete, with a dark cinereous cortex. Leaves rather small, oblong or ovate-oblong or elliptical, lighter-coloured below; lamina 2–2·3 cm. long, 1–1·4 cm. broad, petiole ± 2 mm. long. Spikes axillary, many-flowered, rather dense, often about 2 cm. long. Calyx campanulate, hairy externally, segments 4, acute or subacuminate. Petals ± 2 mm. long. Stamens exserted, longer than the petals, anthers short. Style filiform, ± 4 mm. long. Fruit quadrialate, wings scarious, light brown, about 2–2·2 cm. long, 1·1–1·2 cm. broad including wings.

EUGENIA OWARIENSIS P. Beauv., forma.

Hab. Salisbury, Aug., No. 468; Sept., No. 586.

DISSOTIS PHÆOTRICHA Hook. fil.

Hab. Salisbury, Dec., No. 76.

AMMANNIA SENEGALENSIS Lam.

Hab. Buluwayo, May, No. 337.

NESÆA SAGITTÆFOLIUM Sonder.

Hab. Buluwayo, May, No. 330.

N. TRIFLORA H. B. K.

Hab. Salisbury, Sept., No. 588.

WORMSKIOLDIA LONGIPEDUNCULATA Masters, forma.

Hab. Buluwayo, Dec., No. 20. Salisbury, in flower and young fruit, Sept., No. 613.

"The colour of the flowers is well maintained in drying. It is fairly plentiful, and its beautiful pure red flowers make it one of the most striking of the early spring flowers."—R. F. R.

This is a form differing from type in peduncles being longer, but not several times longer, than the leaves. It is a perennial, and has the characteristic purplish or violet hairs on the stem.

W. LOBATA Urban.

Hab. Buluwayo, Dec., No. 13. Apparently most southerly point from which this plant has been recorded.

STREPTOPETALUM SERRATUM Hochst.

Hab. Buluwayo, early Jan., No. 68.

Tryphostemma pedatum, sp. nov. Caules glabrescentes verisimiliter annui e radice perenni orti; foliis pedatim lobatis, lobis mediis oblongo-lanceolatis argute serratis apice mucronatis petiolatis; appendiculis stipuliformibus semisagittatis acuminatis supra foliorum insertionem cauli insertis, textura coloreque foliis consimilibus; pedunculis cirriferis quam foliis brevioribus sæpissime 2-floris; sepalis oblongis obtusis nervosis; petalis oblanceolatis subæquilongis; disci corona exteriore longe fimbriata, corona

interiore annulata brevissima; filamenta summo tubo hyalino hypogyno intus adnata; ovario elongato-conoideo in stylos 3 filiformes stigmata parva capitata ferentes exeunte; capsulis chartaceis 1-spermis.

Hab. Near Shashi River, Jan., No. 67.

This plant belongs to the section *Neotryphostemma* Engler.

Stems glabrescent, considerably more leafy than in the case of *T. triloba* Bolus (see Hook. *Icones*, t. 1838). Leaves pedately lobed. Three middle lobes oblong-lanceolate, somewhat narrowed towards both extremities, sharply serrate, apex mucronate, 5–7 cm. long, lateral lobes shorter, again dividing. Cotyledonary leaves unlobed, oblong-ovate. Petiole 5–7 mm. long. Peduncles cirrhiferous, 2-flowered, shorter than the leaves. Sepals nerved, 3 mm. long, in fruit rather longer. Petals oblanceolate, membranous, nearly same length as sepals. Exterior corona fimbriate, interior short. Styles 3. Capsule chartaceous—those present are not fully ripe and about 1 cm. long, those examined one-seeded.

T. APETALUM var. SERRATUM Bak. fil.* Caules vel rami herbacei verisimiliter ex radice perenni orti virgati striati, foliis brevissime petiolatis oblongo-lanceolatis glauco-viridibus apice mucronatis basi cuneatim angustatis argute serratis; stipulis parvis linearibus subulatis, appendiculis stipuliformibus 2 magnis crescentiformibus serratis supra pedunculos e caule exorientibus; pedunculis gracilibus strictis sæpissime 2-floris erecto-patentibus quam foliis brevioribus in cirrhum simplicem et curvatum exeuntibus, pedicellis gracilibus bracteatis; sepalis 5 oblongis vel obovato-oblongis obtusis vel subacutis (in sicco flavo-viridibus); petalis nullis; corona exteriore gamophylla cylindracea ore longe fimbriata, corona interiore annulari brevissima; staminibus 5 inclusis margine interiori coronæ interioris insertis; fructu pericarpio chartaceo ovoideo stirpe quam sepalis breviore.

Hab. Salisbury, in flower and fruit, Dec., *G. A. K. Marshall.*

This is the food-plant of the two butterflies *Acræa nohara* and *A. caldarena.*

The type *T. apetalum* Bak. fil. comes from Mts. Milanji and Zomba.

Whole plant somewhat glaucous green. Stem or branches herbaceous, virgate, striate. Leaves subcoriaceous, oblong-lanceolate, apex acute, base cuneate, strongly serrate, petiole very short, lamina 3–6 cm. long, nearly 1·3 cm. broad. Stipuliform appendages similar to those in the type, but rather larger and more strongly serrate, point of attachment above insertion of petiole. Peduncles axillary, generally 2-flowered, about 2·5 cm. long, terminating in a tendril which is often slightly over 2·5 cm.; pedicels 4–6 mm. long in flowering stage, lengthening in fruiting stage (6–10 mm.). Bracteoles cirrhose, distant about 5 mm. from sepals. Sepals 5, oblong or ovate-oblong. Ring of corona about 3 mm. high, upper

* I was at first inclined to consider the above worthy of specific rank, but a plant collected by Dr. Rand at Salisbury, No. 470, appears to be intermediate between this and the type.

portion fimbriate. Stamens 5, staminal disc short. Pistil in flower examined rudimentary. Fruit ovate or obovate, chartaceous, stalked, stalk shorter than sepals.

Differs from the type in larger, more strongly serrate leaves, larger flowers, but with a shorter staminal disc, and in large but more shortly stalked fruit. The fruit-stalk, as has been already stated, in var. *serratum* is shorter than the sepals, while in the type it is longer.

It is a matter for regret that Dr. Engler, when he revised the genera *Tryphostemma* and *Basananthe*, uniting the two (*confer* Engler's Bot. Jahr. xiv. (1891)), did not use the older generic name for the combination. The genus *Basananthe* was published in 1859 in the *Botanische Zeitung* for March, while Mr. Hiern informs me that *Tryphostemma* did not appear in Harvey's *Thesaurus* till towards the close of the same year.

Momordia involucrata E. Mey.
Hab. Buluwayo, May, No. 327.

Cucumis hirsutus Sonder.
Hab. Buluwayo, Jan., Nos. 90 & 91.

Coccinia palmata Cogn.
Hab. Buluwayo, early Jan., Nos. 87 & 89.
Agree with the specimen collected by Burke at Macalisburg, which is so named by Prof. Cogniaux, but seem to differ in certain particulars from *C. palmata*.

Gisekia pharnaceoides L.
Hab. Shashi River, early Jan., No. 56.

Limeum viscosum Fenzl.
Hab. Shashi River, Jan., No. 57.
Leaves elliptical or subelliptical.

Mollugo hirta Thunb. var. virens Hiern.
Hab. Buluwayo, May, No. 331.

Diplolophium zambesiacum Hiern.
Hab. Salisbury, Dec., No. 71 ; July, No. 473.

JOHN HUTTON POLLEXFEN.

Some years ago I had the great pleasure of spending a few days with the late Dr. Pollexfen in his charming home at Middleton Tyas. At that time, although he was nearly eighty years old, he was still as enthusiastic an algologist as ever. He was a handsome old gentleman, very tall and erect, stoutly built, and of a commanding presence. His gentleness of manner, unfailing courtesy, and geniality endeared him to all with whom he came in contact.

For many years before his death he had written nothing on algological matters, and it will probably surprise many of the readers of this Journal to learn that he was alive and in the enjoyment of comparatively good health till the middle of the present

year. Born in Kirkwall in 1813, he early went to the University of Edinburgh to study medicine, taking his M.D. degree in 1835. In accordance with the then prevalent custom, he spent the next year studying his profession on the continent, principally in Paris. In 1839, after his return to Scotland, he was a candidate for the post of naturalist to accompany Captain (afterwards Sir James) Ross on the expedition which was then about to start on a voyage of discovery to the Antarctic, but on learning that Mr. (now Sir Joseph) Hooker and himself were the two selected candidates, he withdrew his name in favour of his friend. Before this date he had made a large collection of Orkney seaweeds, and was in correspondence with Mrs. Griffiths, Dr. R. K. Greville, Sir W. J. Hooker, and other well-known botanists.

Pollexfen now, for a time, turned his attention to geology, making three collections of fossils from the old red sandstone, which till then had been considered by geologists a formation in which no fossil remains existed. One of these collections is now in the Woodwardian Museum at Cambridge. About this time he decided to give up the practice of medicine, which was distasteful to him, and enter the Church. In 1840 he went to Queen's College, Cambridge, where he made the acquaintance of Adam Sedgwick and Sir Richard Owen, and was elected a Fellow of the Ray Society, of which he was the only undergraduate member. He graduated in 1813, taking his M.A. degree three years later. In 1844 he was ordained, and spent the remainder of his life in the active discharge of his clerical duties, principally at Colchester, East Wetton, and Middleton Tyas, where he died on the 5th of last June, having been for twenty-five years vicar of the parish.

By his death the last link uniting the algologists of the first half of the century with those of the present day has been broken. As has already been stated, he was the friend and correspondent of Mrs. Griffiths and Dr. Greville; he was also on most intimate terms with Mr. W. H. Harvey, to whom he supplied most of the information on Orkney seaweeds contained in the *Phycologia Britannica*. He was the first to notice *Antithamnion floccosum* Kleen on the shores of these islands. At first Harvey believed this was a new species, and published a description of it under the name *Callithamnion Pollexfenii;* subsequently, however, he discovered that it was the *Conferva floccosa* of the *Flora Danica*. It was from specimens in Pollexfen's herbarium that Harvey drew the figures of *Chrysymenia Orcadensis*, *Ectocarpus longifructus*, and *Nitophyllum punctatum* var. *Pollexfenii*. Pollexfen also drew up a very complete list of the Marine Algæ of Orkney for his friend the late G. W. Traill, who made great use of it in his "List."

Pollexfen belonged to that rare class of field naturalists who do more collecting than writing, but his name will ever remain familiar to algologists through the genus *Pollexfenia*, which Harvey named after his friend. Through the kindness of his family, his collection of seaweeds has come into my possession, where it will always be open to inspection.

EDWARD A. L. BATTERS.

SHORT NOTES.

Staffordshire Mosses.—The following additions have been made to the moss flora of Staffordshire since 1896, partly from notes and specimens communicated by Dr. J. Fraser, Rev. A. Ley, Rev. H. P. Reader, and my own more recent notes in the county :—*Sphagnum tenellum* Ehrh. Norton Bog, *J. Fraser !*—*Pleuridium alternifolium* Rab. Compton, Wolverhampton, *J. F.*—*Dicranella Schreberi* Schp. Footways near Alldridge.—*Acaulon muticum* C. M. Rugeley, *H. P. Reader !*—*Phascum cuspidatum* var. *curvisetum* N. & H. Hawkesyard Priory, Rugeley, *H. P. R. !*—*Barbula sinuosa* Braith. Alstonfield, *A. Ley !*—*B. convolutata* var. *sardoa* B. & S. Mill Dale, *A. L. !*—*Weissia tenuis* C. M. Hawkesyard Priory, *H. P. R. !* Bridge over Blith, near Blithbury.—*Zygodon viridissimus β rupestris* Ldb. Alstonfield, *A. L. !*—*Funaria ericetorum* Dixon. Seckley Wood, *J. F. !*—*F. hygrometrica* Sibth. Common; omitted in list.—*Bartramia pomiformis β crispa* B. & S. Dove Dale, *J. F. !* near Sandon.—*B. Œderi* Sw. Dove Dale, *J. F.*—*Webera cruda* Schwg. Rocks by Alton Towers.—*Bryum roseum* Schwg. Dove Dale, *J. F. !*—*Leucodon sciuroides* Schwgr. Alstonfield, *A. L.*, Ilam.—*Thuidium recognitum* Lindb. Alstonfield, *A. L. !*—*Plagiothecium denticulatum β aptychus* L. Cat. Oulton, Baggeridge Wood, Areley Wood.—Var. *densum* Schp. Codsall Wood.—*Hypnum riparium* var. *brevifolium*. Cotton in Clay.—*H. aduncum* var. *falcatum* Sch. Stream near Flash.—*H. palustre β hamulosum* B. & S. Upper Cotton; Areley Wood.—*Hylocomium squarrosum β calvescens* Hobk. Near Areley; near Gailey.—James E. Bagnall.

Pertusaria incarnata.—On looking over a collection of Lichens which I had made at Freshwater Bay in the Isle of Wight, on April 10th, 1893, I noticed one which looked different from any I had seen before. It resembled *Lecanora parella*, but all its parts were too delicate and too small. I next thought it might be *Pertusaria velata*, but, although the description of the thallus was similar, the chemical reaction, K— C—, and the much smaller spores, showed its difference. On further investigation, I came to the conclusion that it was probably the rare *Pertusaria incarnata*, found by Mr. Larbalestier in Ireland. It seems to agree with his description of that plant (Trans. Linn. Soc. Ser. 2, i. 241, t. xxxiii.) in all its details except the word "effuse," which he uses in relation to the margin of the thallus. My specimen is growing on flint, along with *Lecidea petræa*, &c., and covers a nearly circular space of about an inch and a quarter in diameter. The centre of the thallus is rough and darker, the apothecia occupying this portion, the oldest and largest being in the middle, and gradually decreasing in size and age as they occur outwards; beyond this, the thallus assumes a zonal form, being made up of alternating lighter and darker bands, varying in breadth and getting lighter towards the margin, which is the lightest of all. The colour of the thallus is pale brown, with a tinge of green in the centre, graduating through the zonal region

to a whitish grey on the outer edge. Apothecia one-sixteenth of an inch in diameter. Spores simple, ellipsoid, colourless, ·06 mm. long, ·03 mm. broad.—W. H. Wilkinson.

Middlesex Mosses.—The following mosses, new for Middlesex, have been met with since those recorded in this Journal for 1894, pp. 106, 369; 1896, p. 400:—*Pottia littoralis* Mitt. Frays Meadows, Uxbridge.—*Bryum murale* Wils. Canal-walls near Harefield.—*Mnium punctatum* L. Margin of watercourses in Mad Bess Wood (Ruislip Woods).—*Brachythecium salebrosum* B. & S. var. *Mildeanum* (Schp.).—Canal-walls, &c., between Denham and Moor locks (fruiting freely).—*Hypnum aduncum* Hedw. Ruislip Reservoir, Frays Meadows, Harefield Moor, Northwood, &c. (omitted in former lists).—*Dicranum montanum* Hedw. S.E. corner of Duck Wood, abundantly. — *Dicranum flagellare* Hedw. Grows sparsely on rotten oak-stumps in all the Ruislip and Harefield Woods.—John Benbow.

Flora of Cheshire.—I am sorry to find that there are two errors in this Flora, for which I am responsible. One is *Epilobium hirsutum* × *montanum*, which I never gathered: *E. hirsutum* × *obscurum* was the plant intended, and I must have written the former hybrid by a slip. The other mistake is *Lycopodium Selago*, also probably my slip, for *L. clavatum*. The latter plant is very rare in the station given, and though I tried hard to establish the record there for *Selago* this summer I failed, and must ask leave to expunge it.—A. H. Wolley-Dod.

NOTICE OF BOOK.

The Origin of the British Flora. By Clement Reid, F.R.S., F.L.S., F.G.S. 8vo, pp. 192. London: Dulau & Co. Price 5s.

This thin volume contains a summary of the results of some twenty-three years' patient and painstaking investigation of the vegetable remains found in the newer tertiary deposits of this country, together with the conclusions the author has deduced therefrom, as to the changes the flora has undergone from climatic and other causes. The book is divided into six chapters and an appendix.

The first chapter is introductory; the second is occupied with remarks as to the existing flora, with especial reference to the groups into which its members may be divided, from the standpoints of climate, habitat, and geographical distribution. In this there is little, if anything, that is new. Chapter three, which relates to the means of dispersal of the plants of this country, will probably be found the most generally interesting. The principal means of dispersal are summarized as follows:—

Modification.	*Mode of Dispersal.*
Abundance of minute seeds (Heaths, Rushes, Saxifrages, Caryophyllaceæ, &c.).	Readily moved by accidents of all sorts.
Abundance of large edible seeds (Oak, Pine, Hornbeam, Ivy, &c.).	Eaten or dropped by birds; most are destroyed, but some are transported uninjured.
Winged seeds (many Composites, Willows, &c.).	Transported by wind.
Winged seeds with lax hairs (Willow-herbs, Willows, Bulrush, &c.).	Cling to feathers or fur.
Burrs and hooked seeds.	
Floating seeds.	Transported by water.
Cut-leaved submerged water-plants (Water Crowfoot, Water Milfoil, &c.).	Collapse and cling when removed from the water; stems fragile, and broken pieces grow. Carried on legs of mammals or of wading birds.

Mr. Reid points out that, from the many climatic changes this country has passed through, the flora must be one highly specialized for distribution. The proportion of small-seeded plants, which are most readily dispersed, he shows to be greater than on the continent. The comparatively small number of *Compositæ* in our flora he attributes to the country having in the past mainly consisted of woodland, while the plants of that order are mostly "prairie species." An interesting observation is recorded as to the dispersal of acorns through the agency of rooks, and Mr. Reid points out that comparatively soft seeds may sometimes be transported in the crops of birds, and enabled to germinate either from an accident happening to the bird before its food had had time to digest, or through the food being rejected owing to excessive or injudicious feeding, which he says is not an uncommon occurrence.

The changes of land and sea and climate during these later tertiary times are dealt with in Chapter IV. The middle tertiary flora was a subtropical one, not allied to that now occupying the country. From the miocene and older pliocene times there are no recognizable plant-remains. In the earlier stages of the newer pliocene period Britain seems to have taken somewhat of its present form, though the climate was still warmer than now; but it is only in the latest pliocene deposits that a copious land-flora is found, and, as far as the plants now inhabiting Britain are concerned, history begins with the Cromer Forest-bed, which consists of a series of estuarine and lacustrine strata, laid down apparently by the ancient Rhine, which seems to have crossed the low area now occupied by the southern half of the North Sea, the Straits of Dover having probably not yet been cut. The climate was a temperate one. A submergence of perhaps fifty feet then took place. After this followed a colder period, with arctic plants. Then commenced the glacial epoch, with an ice-sheet continuous with that pouring

down from Norway, and reaching as far south as the Thames. To this epoch, when the drainage of a large part of Europe was poured into the North Sea, but could not escape northward on account of the ice, probably belongs the severance of England from the continent. An arctic flora then inhabited the non-glaciated area south of the Thames and Severn. During the "inter-glacial" period a large temperate flora occupied the country. After this there is a break in the records, with a submergence of about one hundred and forty feet, and a somewhat warmer sea, followed by a gradual rising of the land and a prolific flora, including several southern plants, after which was a second, though less severe, glaciation. Later in neolithic times, the land stood some sixty or seventy feet above its present level, and the "submerged forests" were formed.

In dealing with the "Deposits containing Fossil Plants" (Chapter V.) Mr. Reid points out that the best hunting ground has been in the deposits from comparatively small streams, where the seeds are better preserved and more varied than in lacustrine or peat beds. The deposits are divided into five groups:—Pre-glacial, represented by the latest pliocene beds of Norfolk and Suffolk; Early-glacial, from a few localities on the Norfolk coast; Inter-glacial, from various beds in the eastern and southern counties; Late-glacial, from scattered localities throughout England and Scotland; and Neolithic, including the "submerged forests" and early peat mosses. Lists are given of the various species found at each locality, the richest collection, numbering ninety-four species, being from West Wittering, Sussex.

The last chapter contains an account arranged under the species, of the various beds in which each has been collected, including those recorded from Scandinavia and Germany, and not yet found in Britain. In the appendix the species are tabulated, with columns showing the geological periods to which the remains belong. The total number of species included is two hundred and seventy. In the British deposits five have been identified which do not now occur in this country:—*Acer monspessulanum*, *Trapa natans*, *Salix polaris*, *Picea excelsa*, and *Naias minor*, besides *Naias graminea*, which now occurs as a recent introduction. Mr. Reid has other seeds not yet determined which he considers cannot belong to existing British species. *Chelidonium majus*, classed by Watson as a denizen, and *Valerianella olitoria*, queried by him as a native, are both recorded from the inter-glacial deposits; and *Galeopsis Tetrahit*, queried as a native or colonist, is found in the late-glacial and neolithic deposits. A fruit from the inter-glacial and pre-glacial deposits, which has been described under the names *Paradoxocarpus* and *Folliculites carinatus*, is now identified as belonging to *Stratiotes aloides*. The list is not of course supposed to represent the complete floras of the various periods. Most of the soft-seeded plants would only occasionally leave any recognizable trace, and, from the nature of the deposits, the remains of water and marsh plants would greatly predominate, and the presence of dry-ground species would be more or less accidental. Perhaps the most noticeable absence from the records is that of the whole of the *Juncaceæ*. One would have

thought the seeds and capsules of species of *Juncus* would have been plentiful. Of the *Gramineæ*, *Phragmites communis* only is admitted, the author considering that seeds and other remains of some other grasses supposed to be fossil are really recent.

Mr. Reid has experienced considerable difficulty in comparing fossil fruits with those of recent species, from the great lack of specimens with ripe fruit in the public herbaria. In the introductory chapter he is very severe and not quite just in his remarks on the work of critical botanists. For instance, he is going too far when he says: "Many of our named subspecies have evidently no more claim to such rank than have luxuriant garden specimens," though it must be admitted that sufficient discrimination has not always been used, and many varietal names which have been given to trivial forms might with advantage be discarded.

The book is well printed, and the writing is pleasant and lucid, but in parts there is a lack of finish, due apparently to haste on the author's part in the final stages of the work. It represents a very valuable contribution to the knowledge of the subject, and, apart from the large amount of information it contains, it will be of great use to botanists generally on account of the problems and lines of research which it suggests. Mr. Reid does not pretend to have dealt exhaustively with the subject, and we hope that what he has done will have the effect of stirring up other workers to assist him with material and observations, so that this useful little book will be the forerunner of a much larger and more complete work on the early history of our present flora.

H. & J. Groves.

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*ARTICLES IN JOURNALS.**

Annals of Botany (Sept.). — D. M. Mottier, 'Effect of Centrifugal Force on the Cell' (1 pl.). — R. H. Biffen, 'A Fat-destroying Fungus' (1 pl.). — L. A. Boodle, 'Anatomy of the *Ophioglosseæ*' (1 pl.). — H. De Vriese, 'Biastrepsis in relation to cultivation.'— J. B. Farmer & W. G. Freeman, 'Structure and Affinities of *Helminthostachys*' (3 pl.).—M. M. Hartog, 'The alleged fertilization in *Saproleynieæ*.'

Bot. Centralblatt (Nos. 32–36).—F. Brand, '*Cladophora*-studien' (3 pl.). — (Nos. 33, 34). L. Marchienski & F. G. Kohl, 'Über Chlorophyll und seine Derivate.'—G. Bode, 'Ueber Phylloxanthin.' —(Nos. 35, 36). F. G. Kohl, 'Untersuchungen über die Raphidenzellen' (1 pl.).—A. Fleroff, 'Einfluss der Nahrung auf die Athmung der Pilze.' — (Nos. 37, 38). W. Meyer, 'Ueber den Einfluss von Witterungs- und Boben-verhältnissen auf der anatomischen Bau der Pflanzen.'—E. K. Blümml, 'Rhodologische Miscellaneen.'—(No. 39). E. H. L. Krause, 'Floristische Notizen: Ericales et Primulales.'

Bot. Gazette (29 July).—G. F. Atkinson, 'Studies on Reduction

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

in Plants' (6 pl.).— C. Robertson, 'Flowers and insects' (cont.).— J. M. Coulter, 'Origin of leafy sporophyte.' — T. Holm, 'Seedlings of *Jatropha multifida* and *Persea gratissima*.' — M. Radais, 'Blight of *Sorghum*.' — F. H. Lamb, 'Root suckers on Douglas Fir.'— (24 Aug.). — E. J. Fulmer, 'Microspores of *Hemerocallis fulva*' (2 pl.). — B. M. Davis, 'Spore-mother-cell of *Anthoceros*' (2 pl.).— LeRoy Abrams, 'Development of *Cryptomitrium*.' — A. Nelson, 'Species of *Tetraneuris* and allies' (*Actinella*, auct.). — M. L. Fernald, '*Pycnanthemum verticillatum*.'

Bot. Zeitung (16 Aug.). — G. Steinmann, 'Ueber fossile Dasycladaceen vom Cerro Escamela, Mexico.' — (16 Sept.). C. van Wisselingh, 'Ueber das Kerngerüst' (1 pl.).

Bull. Bot. Soc. France (xlv. 9: Aug.).— —. Boulay, 'Les Rubus (Discolores) de la Flore Française.' — D. Clos, 'L'épithète *vulgaris* en glossologie botanique.' — G. Gandoger, 'Notes sur la flore espagnol.' — (xlvi. 3: Sept.). H. Suder, 'Revision des Rubus de l'Herbier du Tarn et de Martrin-Donos.'— —. Sennen, 'Mes herborisations dans les Pyrénées-Orient.'—Th. Delacour, *Viola Vilmoriana*.

Bull. de l'Herb. Boissier (25 July). — A. Chabert, 'Sur le genre *Rhinanthus*' (concl.).—F. Stephani, 'Species Hepaticarum' (cont.). —A. M. Boubier, 'Contributions à l'étude du pyrénoïde.'—(25 July & 30 Aug.). Th. Lœsener, 'Plantæ Selerianæ' (cont.).—(30 Aug.). H. de Boissieu, 'Les Renonculacées du Japon.' — C. Meylan, 'Flore bryologique du Jura.' — G. Gaillard, 'Mélanges rhodologiques.'—Ph. de Palézieux, 'Blatt der Melastomaceen.'

Bull. Torrey Bot. Club (17 Aug.).—K. M. Wiegand, 'Species of *Bidens*.' — A. M. Vail, 'Studies in *Asclepiadaceæ*.' — D. Griffiths, 'Pyrenomycetes' (2 pl.).—E. P. Bicknell, '*Sisyrinchium*' (cont.).

Erythea (1 Aug.).—W. G. Farlow, 'Californian Algæ.'—(1 Sept.). M. E. Adamson, 'Teratological Notes on *Eschscholtzia californica*.'

Gardeners' Chronicle (12 Aug.). — *Asplenium Faucetti* Jenman, sp. n.—C. T. Druery, 'British Polystichums.'—(26 Aug.). G. Henslow, ''Mimicry' in Plants.'—*Stanhopea Fuerstenbergia* Kranzl., sp. n.

Malpighia (fasc. 3).—P. A. Saccardo, 'La Iconoteca dei Botanici nel v. Istituto botanico di Padova.' — F. Cavara, 'Microcecidii fiorali del *Rhododendron ferrugineum*.'

Nuovo Giorn. Bot. Ital. (July).—G. B. Traverso, 'Flora nobica pavese.' — C. Casali, 'Aggiunte alla Flora del Reggiano.' — A. Bégninot, 'Di alcuni generi della flora delle paludi Pontine.'— N. Passerini, 'Fermenti zimici ossidanti nelle piante fanerogame.' —F. Cavara & P. A. Saccardo, *Tuberculina Sbrozzii*, sp. n. (1 pl.).

Oesterr. Bot. Zeitschrift (Aug.). — K. v. Keissler, 'Ueber einen androgynen Fichtenzapfen.' — J. B. Scholz, '*Senecio erraticus* & *S. barbaræifolius*.' — J. Velenovsky, '*Micromeria Frivaldskyana* & *M. balcanica*.'—J. Steiner, 'Flechten aus Armenien und dem Kaukasus.' —M. Schulze, 'Die Orchidaceen Deutschlands.'

Rhodora (Aug.). — E. G. Stone, 'Floral conditions in Central Massachusetts.' — E. G. Britton, *Grimmia Evansi*, sp. n. (1 pl.).— M. L. Fernald, 'New England Antennarias.' — (Sept.). M. L. Fernald, 'Plant-names of Madawaska Acadians.' — 'Plants introduced by Minot Pratt at Concord, Mass.'

BOOK-NOTES, NEWS, &c.

Mr. H. N. Ridley contributes to the *Journal of the Royal Asiatic Society* (Straits Branch, No. 32) an important paper on "The Scitamineæ of the Malay Peninsula." Two new genera are established—*Camptandra* (which includes *Kaempferia parvula* Baker) and *Conamomum*.

The "July–August" number of the Kew *Bulletin* (published in August) contains a paper on New Guinea plants in which many new species and a new genus—*Dolianthus* C. H. Wright (Solanaceæ)—are described. *Giuianettia* Rolfe, to which "gen. nov." is appended, was figured and described by Mr. Rolfe in *Icones Plantarum*, t. 2616. The list contains a somewhat large number of imperfectly determined species, the publication of which seems scarcely worth while. Mr. Rolfe contributes two decades of new Orchids, almost all from North-east Celebes. Museum officials are frequently applied to nowadays for information which may be helpful in the solution of "prize puzzles," and a correspondent suggests that Mr. Massee may have been selected by the Kew authorities to supply such information. The suggestion is based on the fact that he is described in this number of the *Bulletin* (p. 90) as "Principal Assistant for Cryptograms," but we imagine the printer must be held responsible for this.

The *Tenth Annual Report of the Missouri Botanic Garden* is devoted to an enumeration of the Grasses in the Bernhardi Herbarium, a large number of which represent the species described by Presl in *Reliquiæ Hænkeanæ*. The paper is illustrated by 54 plates. A memoir of Edward Lewis Sturtevant (1842–1898), with portrait, a paper by Dr. H. von Schrenk on "a Sclerotioid Disease of Beech-roots," and a general index to the ten volumes, make up the remainder of the book.

We are glad to record the publication of another instalment (vol. vii. part 3) of the *Flora Capensis*, in which Dr. Stapf continues his enumeration of the *Gramineæ*.

The seventh volume (dated Aug. 5th) of the *Memoirs of the Torrey Botanical Club* is devoted to a monograph of the Hepaticæ and Anthocerotes of California, by Mr. Marshall Avery Howe. It is illustrated by 35 plates.

We have received the second part of *Natal Plants*, by Messrs. J. M. Wood and M. J. Evans, the first instalment of which was noticed in last year's Journal (p. 327). The remarks there given apply equally to this, which completes the first volume of 100 plates. We are still of opinion that the selection might be more interesting, and we would suggest that in every case the reference to the place of publication should follow the name of the species. We notice one novelty—*Uncinotis inandensis*; there may possibly be others, but this is the only name to which "n. sp." is attached. It is probably the modesty of the authors that we must blame for the inconvenient name "*Combretum* (*Poivrea bracteosa* Hochst.);" but in such a case convenience and custom suggest that they should form

and append their names to the necessary new combination. Perhaps their action is intended as a protest against the too common practice in an opposite direction.

The first two parts of Mr. Pearson's *Hepaticæ of the British Isles* (price 7s. 6d. each coloured, 5s. uncoloured) have just been published by Messrs. Lovell Reeve & Co. This is by far the most elaborate work on this neglected group of plants which has appeared since Hooker's *British Jungermanniæ* in 1816. While in the fulness of text and illustrations it bids fair to be of great service to the advanced student, it seems matter for regret that more aid has not been given to the beginner: there are no keys either to genera or species, nor any synopsis of the genera. The descriptions of the species are very full, and are followed by valuable notes pointing out the relationship and differences of allied plants, with elaborate measurements and a detailed account of distribution. Each plate is devoted to a single species, the entire plant, both natural size and enlarged, with numerous details of leaves, bracts, cell-structure, and reproductive organs, being represented. The typographical arrangement of the work is to our thinking unsatisfactory, and the bibliography lacks completeness. We hope later to notice the work at greater length.

We are glad to announce the publication of a new part (vol. v. (pt. 1) of the *Flora of Tropical Africa*. It is entirely devoted to, but does not complete, the enumeration of the *Acanthaceæ* by Messrs. C. B. Clarke and I. H. Burkill, and contains a large proportion of new species and one new genus—*Acanthopale* Clarke, which comprises the African species assigned to *Strobilanthes* by Bentham and Hooker.

The Report of the Director of the Botanical Survey of India for 1898–99 announces two interesting works as in preparation. The *Flora of Simla*, by Colonel Sir Henry Collett, K.C.B., will contain a descriptive list of all the flowering plants and vascular cryptogams found in the neighbourhood of Simla. This handbook, which is to be illustrated, will be extremely useful, not only for the residents at Simla, but also at all hill stations between Murree and Naini Tal. *A Manual of the Flora of the Forest School Circle*, by Baboo Upendronath Kanjilal, Instructor at the Dehra Forest School, will give descriptions of all the trees and shrubs occurring within the limits of the School Circle, and will include Dehra Dun and the Siwalik range, as well as the Himalayan region within Jaunsar, and the Tihri-Garhwal leased forests beyond the Tons Valley. The work will be remarkable as representing the first production of its kind written by a native of India.

George Buchanan Wollaston was born at Clapton, Middlesex, on April 26, 1814. He was articled to Pugin, and worked as an architect for some years; but coming into a small property, he gave up his profession almost entirely, and devoted himself to the study of Botany, and more especially of British ferns. He purchased a small property called Bishop's Well, Chislehurst, where he lived

for about forty-six years, till his death on the 26th of last March. In the garden and old-fashioned greenhouse of that house he had a marvellous collection of British ferns. Every species was represented, and thousands of varieties. He devoted his attention especially to the modes of fern-propagation: also to the subject of the variegation of plants. Mr. Wollaston contributed notes and short papers to both series of the *Phytologist*, and his help is acknowledged in the recently published *Flora of Kent*.

Concurrently with part iv. of the *Illustrations de la Flore du Congo* we received the first fascicle of *Contributions à la Flore du Congo*, for which Messrs. De Wildeman and Th. Durand are also responsible. The editors have secured the co-operation of various botanists of repute, who have undertaken the orders with which they are specially cognizant. Numerous new species are described, and there is a new genus—*Spironeurum* Radlkofer (Sapotaceæ).

Prof. Henslow has an article in the *Gardeners' Chronicle* for Aug. 26 on 'Mimicry in Plants,' in which, having adduced a number of instances, he says: "One might multiply these resemblances *ad infinitum*, and call them 'mimetic'; but it is obvious that any notion of one kind protecting another which it may resemble, is quite out of the question."

The death, in September, of Mrs. Catharine Parr Traill (*née* Strickland) at Lakefield, Ontario, has removed from us one of the oldest of our naturalists. Born in London on Jan. 9th, 1802, Mrs. Traill went with her husband to Canada in May, 1832, a week after their marriage, and never returned to her native land, for which she always cherished a tender affection. Her sisters, Elizabeth and Agnes, are well known as authors of *The Lives of the Queens of England*, and other members of her family contributed to literature. Mrs. Traill began to write as a child, and published several little story-books before she was twenty; soon after she settled in Canada she wrote a little volume on *The Backwoods of Canada*, which was published in 1836 in Knight's "Library of Entertaining Knowledge." In this her love of natural history manifested itself, and as time went on she acquired a considerable herbarium of flowering plants and mosses; she also sent small collections of these to England for sale. In 1869 Mrs. Traill's botanical notes were utilized in a book by her niece, Mrs. FitzGibbon, on *Canadian Wild Flowers*; and in 1885, at the age of eighty-three, she published a volume called *Studies of Plant Life in Canada*—a pleasant chatty book, not perhaps strictly botanical, but showing an intimate knowledge of the plants mentioned. A variety of *Aspidium marginale*, named *Traillæ* in her honour by Prof. George Lawson, is described in the book. In 1894 Messrs. Sampson Low & Co. published another book—*Pearls and Pebbles, or Notes of an Old Naturalist*, which is more general in scope; it is prefaced by an interesting biographical sketch by Mrs. FitzGibbon, from which the information given above is mostly extracted. To each of these works a portrait with autograph is prefixed.

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BRITISH AND FOREIGN.

EDITED BY

JAMES BRITTEN, K.S.G., F.L.S.,

SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM (NATURAL HISTORY).

CONTENTS.

	PAGE
On Certain Structures in *Phyllactinia* Lév. By ERNEST S. SALMON (Plate 403)	449
The Early History of Indian Botany. By Sir GEORGE KING, K.C.I.E., etc.	454
Mycetozoa from the State of Washington. By ARTHUR LISTER, F.R.S.	463
The Mosses of West Lancashire. By J. A. WHELDON & ALBERT WILSON	465
Critical Notes on some Species of *Cerastium*. By FREDERIC N. WILLIAMS, F.L.S. (continued)	474
Notes on North Uist Plants, &c. By W. A. SHOOLBRED, M.R.C.S. ..	478
Bibliographical Notes:— XXI. Frasers' Catalogues. By JAMES BRITTEN, F.L.S.	481
SHORT NOTES. — Note on *Linaria*.— *Hierochloë* v. *Savastana*.—*Pyrus latifolia* in N. Somerset	488
NOTICES OF BOOKS:— The Teaching Botanist. By WM. F. GANONG, Ph.D.—A Practical Introduction to the Study of Botany and Flowering Plants. By J. BRETLAND FARMER, M.A. — Botany for Beginners. By ERNEST EVANS	489
The Flora of Tropical Africa: *Acanthaceæ*, by I. H. BURKILL & C. B. CLARKE	491
Two Reprints	493
Articles in Journals	495
Book-Notes, News, &c.	496

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THE JOURNAL OF BOTANY was established in 1863 by Dr. Seemann. In 1872 the editorship was assumed by the late Dr. Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

Without professing to occupy the vast field of general Botany, the Journal has from its inception filled a position which, even now, is covered by no other periodical. It affords a ready and prompt medium for the publication of new discoveries, and appears regularly and punctually on the 1st of each month. While more especially concerned with systematic botany, observations of every kind are welcomed. Especial prominence has from the first been given to British botany, and it may safely be said that nothing of primary importance bearing upon this subject has remained unnoticed.

Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains. Many important monographs and other works first appeared in its pages. In 1896 it became necessary to increase its size, owing to the number of papers sent for publication: the number of plates was at the same time augmented.

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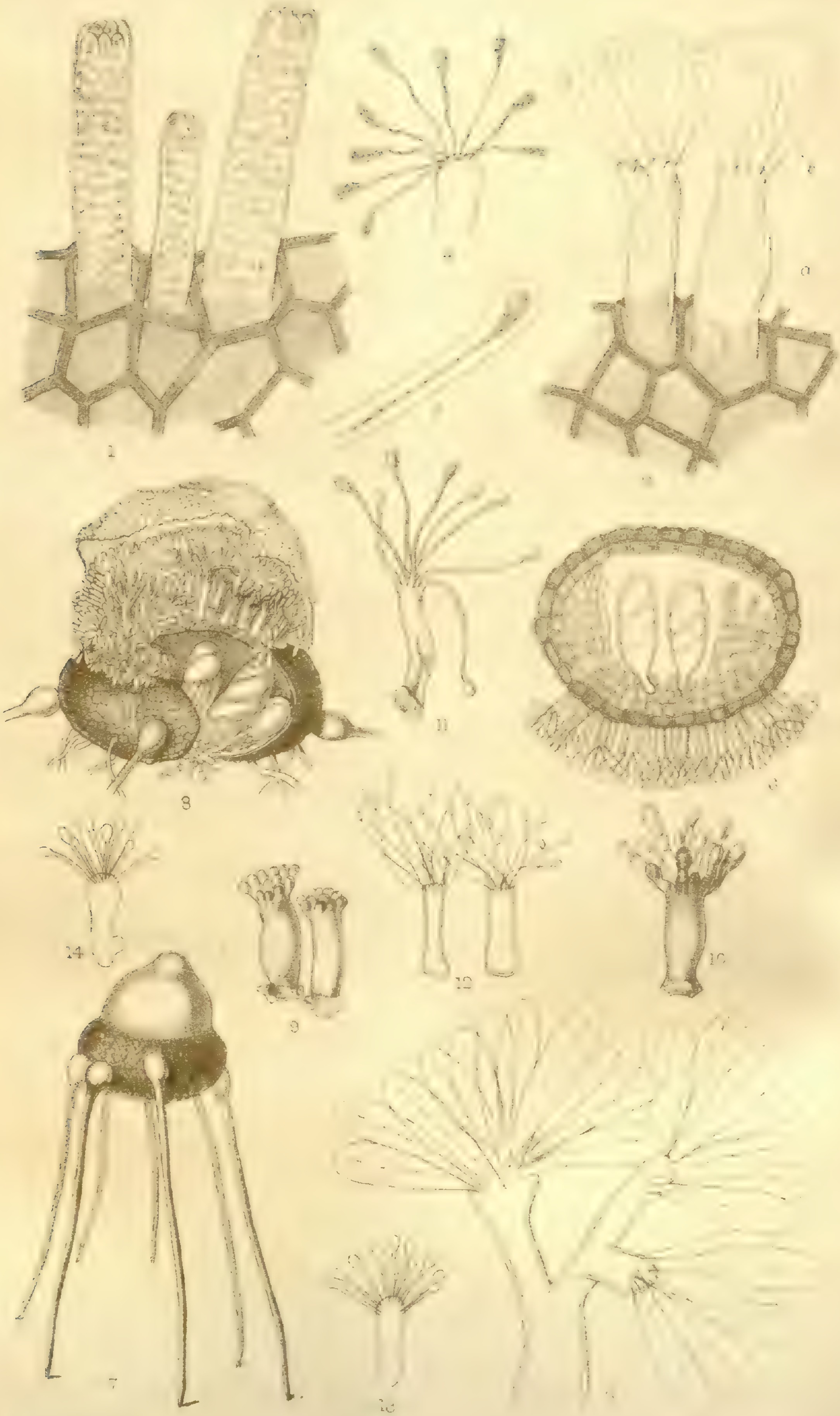

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Phyllactinia.

ON CERTAIN STRUCTURES IN *PHYLLACTINIA* Lév.

By Ernest S. Salmon.

(Plate 403.)

In the course of studies on the *Erysiphaceæ*, I have investigated certain outgrowths from the perithecium of *Phyllactinia corylea* (Pers.) Karst. (*P. suffultum* (Rebent.) Sacc.), the nature and function of which have hitherto been completely misunderstood. I hope very shortly to publish a monograph of the family, and the following remarks and accompanying figures are taken direct from my notes.

It has long been known that in the genus *Phyllactinia* certain structures occur on the perithecium, but of these the most diverse accounts have been given. A few extracts will show the views of previous authors on the subject.

Wallroth (3), in 1819, gave the specific name "*guttata*" to the single species of *Phyllactinia* recognized (under the name of *Alphitomorpha guttata*) on account of the supposed existence of a peculiarity which is thus described:—"Hat nemlich das braune Sporangium seine Vollkommenheit erreicht, dann tritt aus dem obern convexen Theile der braunen Rindensubstanz der innere, kernartige Gehalt in Gestalt einer weissen, durchsichtigen, runden Blase frei hervor, bleibt auf dem Scheitel, den er erweitert hat, festsitzen und trocknet so in ein weissliches Wesen zusammen, während sich die Mündung des peridii externi um derselben zusammenzieht."

This explanation was generally accepted at the time (*cfr.* Link (4) (1824).

In 1842 Nägeli (5) described and figured the outgrowths as a new parasitic fungus, *Schinzia penicillata*, which attacked the perithecia. Each individual *Schinzia* was supposed to consist of a cell attached to the outside wall of the perithecium. The free end of this cell is described as being divided into thread-like branches. At the end of each of these branches a cell—the sporangium—was supposed to be formed. This genus *Schinzia* was considered to show most affinity with *Achlya*. If we compare Nägeli's figures with the structures shown at fig. 4, we shall see that these were undoubtedly what Nägeli had under observation (*cfr.* figs. 4 and 12).

In 1844, Rabenhorst (6) created the genus *Naegelia* for the single species "*Schinzia penicillata*," without, however, adding anything to the knowledge on the subject.

Bonorden was the next to investigate the structures, first in 1851, and then more fully in 1857. In the first work (8) this author stated that Nägeli's "*Schinzia penicillata*" should be regarded as a minute parasitic fungus belonging to the genus *Caeoma*; the cell, however, from which the supposed stalked spore-cells sprang (see fig. 12) was considered as not belonging to the fungus at all, but as being probably a piece of an insect's leg. In 1857 (9) a fuller account was given. Bonorden here stated that when the perithecium of *Phyllactinia* is compressed the wall breaks, and

peculiarly shaped cells appear. These cells are figured, and we see that they are the same as Nägeli's "*Schinzia penicillata*," i. e. the structures shown at fig. 4 (*cfr.* figs. 4, 12, 13, 14). These cells are stated to spring from the inner wall of the perithecium, and to surround the asci. Bonorden continued :—" Wenn das Perithecium reif ist, so öffnet sich dasselbe an der vom Blatte abgewendeten Seite, indem die Zellen desselben sich hier trennen und in Form eines braun-rothen Tropfens hervorgetrieben werden. . . . Aus der so entstandenen Oeffnung, wodurch das Perithecium napfförmig wird, ragen die gestielten Zellen, die Schläuche umgebend, hervor. Diese scheinen keine andere Bedeutung zu haben, als dass sie vermöge ihrer federartigen Leichtigkeit und Flüchtigkeit die Verbreitung der Sporen fördern."

In 1857 Tulasne (11) gave a full account of the structures, and, as this explanation has up to the present been accepted by many mycologists, and as it is correct in many points, it is necessary to quote fully the more important parts. Tulasne said :—"L'*Erysiphe guttata* possède un ornement extérieur qui lui est propre, et dont une exacte interprétation n'a pas encore été donnée, que je sache. Cet ornement . . . consiste en une goutte humide, pâle et brillante, qui apparaît à un certain moment sur le sommet de ses fruits ascophores. . . . Un examen attentif m'a, je crois, fait découvrir en quoi consiste réellement le capitule guttiforme qui, dans *l'Erysiphe guttata* Fr., a motivé tant d'opinions différentes. C'est, dirai-je tout d'abord, un appareil *sui generis*, complétement extérieur au fruit qu'il surmonte, et il ne saurait, en effet, rien emprunter des éléments intérieurs de ce conceptacle, qui n'est pas moins clos ou astome que les fruits ascophores des autres *Erysiphe*. Il est défini ou limité, dans toute sa partie libre, par une membrane incolore, excessivement mince et diaphane, formée de cellules polygonales ; . . . et toute sa masse est composée des cellules pénicilligères. . . . Chacune de ces cellules singulières émet promptement de son sommet un bouquet de processus d'abord brièvement tubuleux, puis claviformes et muqueux. Grâce à la nature hydrophile de ces derniers appendices, la vessie guttiforme se gonfle extrêmement et finit par se rompre ; alors a lieu une sorte de diffluence de son contenu, et les extrémités renflées des processus muqueux paraissent s'isoler pour figurer autant de petits utricules sporoïdes. . . . La vésicule, ou *gutta*, dont il s'agit, quand elle se dessèche, avant ou après sa rupture, prend quelquefois l'apparence d'une sorte de disque inégal ou presque villeux, comme Persoon (Syn. Meth. Fung. 124) lui-même l'avait remarqué."

In 1861, Tulasne (12), in Sel. Fung. Carp., tome i., gave a similar account of the structures, and at tab. 1 figured a number of perithecia showing the "*gutta*" in all stages of development.

In 1896 Vuillemin (15) repeated Bonorden's error of supposing that the branched cells (called by Vuillemin "tubes pénicillés") arise from the interior of the perithecium. As these cells in reality spring from the outermost wall, and are wholly external to the perithecium, Vuillemin's account of how the asci are at first surrounded by the branches of these "tubes pénicillés," and finally

nourished in the disorganised mass of these, must be dismissed as wholly fanciful.

To show the still unsettled state of opinion on the subject, it may be mentioned that quite recently (1898) Magnus (16) has recorded "*Naegelia penicillata*" as a parasite occurring on *Phyllactinia* in the Tirol.

Let us turn to the fungus itself. If we examine a leaf, *e.g.* of *Corylus*, crowded with ripe perithecia, we shall find that many of these agree with the figure of the ripe perithecium given by Tulasne (*l.c.* tab. 1, f. 2, left hand, top corner), *i. e.* they are loose among the hairs of the leaf, and are standing on the points of their apparently reflexed appendages. This position has been supposed by Tulasne and all authors to be normal; consequently the appendages have been described as becoming strongly reflexed, and raising up the perithecium.

On the summit of the perithecium, in this position, Tulasne placed the swelling consisting of the mass of branched cells, and, to show that the summit is the organic apex of the perithecium, Tulasne gave a figure (here reproduced at fig. 8) of a perithecium in section, in which the asci are represented as attached to the opposite end from which the stalked cells spring. This representation, however, is incorrect, as we find on examining a vertical section of a perithecium. Fig. 6 represents such a section; the base of the perithecium is indicated by the insertion of the asci, and it is seen also that the mass of branched cells originates basally.

The shape of these basal outgrowths can be seen best by reference to figs. 1–4. Each outgrowth springs from the external face of one cell of the outer wall of the perithecium, and consists of a stalk-cell (fig. 2 (*a*)), which is usually brownish at base, and a densely clustered head of somewhat swollen tubular hyphal branches (fig. 2 (*b*)). Sometimes the stalk-cell branches irregularly before giving rise to the branches (fig. 3). The function of these special outgrowths, which cover the base of the perithecium in a densely crowded mass, is, I believe, that of attaching the perithecium to the leaf. This is effected, apparently, by means of the mucilaginous degeneration of the crowded heads of branches. In certain stages the protoplasmic contents of the apical tubular branches appear contracted into a somewhat granular thread, which is enlarged at the free end of the branch, while the wall becomes more or less disorganised, so that it can only be seen by staining. In this condition, which is represented at fig. 4, each outgrowth has much the appearance of a stem-cell, bearing a number of stalked spores, and was no doubt mistaken for such by the older authors (*cfr.* figs. 4 and 12). In a few cases I have noticed an opening at the apex of some of the branches, and it has then appeared as though the protoplasmic contents of these branches have disappeared. Certainly the whole mass at some stage of development becomes mucilaginous, and in this condition frequently causes foreign mycelium, spores, &c., to adhere. Through the action of this mucilaginous substance the perithecium often becomes

so firmly attached to the leaf that a little force is necessary to detach it. Having had only dried material at my disposal, I have not been able to study the process in detail, and a close examination of living specimens will be necessary to follow the whole development of these curious outgrowths, and to understand fully the part they play in nature.

A point of considerable interest in connection with these basal outgrowths is the power they possess, after the perithecium on which they occur has been detached from its original substratum, of again becoming mucilaginous, and so causing the refixing of the perithecium to foreign objects. Without here going into details, it may be mentioned that the fungus lately described as "*Erysiphella Carestiana*" has been founded on perithecia of *Phyllactinia corylea* accidentally attached in this manner to the pileus of *Fomes fomentarius*. It is probable also that many of the recorded cases of the occurrence of *Phyllactinia* on herbs (*Angelica*, *Fragaria*, &c.) are due to the same cause. In these cases the perithecia become so firmly reattached to the substratum that some little force is required to move them with a needle.

It may perhaps be well to point out that the existence of some structure at the base of the perithecium in *Phyllactinia* has frequently been referred to by previous authors. It was hinted at by Nees von Esenbeck (1) and by Martius (2); the structure was called the "réceptacle" by Léveillé (7), and at one time even by Tulasne (10), and is probably the "cushion-like mass" referred to by Burrill (14). Atkinson (13) clearly indicated the presence of special outgrowths, describing them as follows:—"There is a second kind of appendage on the perithecia. They are hyaline, knobbed at the end, the knobbed end bearing numerous slender flexuous short filaments."

The manner in which the perithecia become turned over has still to be explained. In the place of the generally accepted idea that the appendages become strongly reflexed, we must now believe that the appendages bend upwards, so that, when turned over, the perithecia rest on the points of these. It is a curious fact that leaf-mites are so very frequently to be found associated with *Phyllactinia*. On the leaves of over 50 per cent. of herbarium specimens I have found traces of these animals, usually in the shape of numerous cast-off skins among the hairs of the leaf. Is it possible that these mites cause the reversal of the ripe perithecia?

I am led to publish the above observations from seeing a preliminary note on the same subject by Dr. Neger in a recent number of the *Botanisches Centralblatt* (Sept. 27) (17). The author, while examining specimens of a *Phyllactinia* from the Argentine, noticed the penicillate cells described by Tulasne. Dr. Neger then concludes:—"Ich fand nun bei der genaueren Untersuchung dieser pinselartigen Zellen, (1). Dass dieselben bei den verschiedenen *Phyllactinia*-Arten verschieden gestaltet sind. Z.B. hat die Stammzelle, aus welcher die Pinselfäden entspringen, bei der vorliegenden argentinischen Art eine an verzweigte *Clavaria*-Arten errinnernde Gestalt, weshalb ich diese Art *Ph. Clavariæformis* nenne. Hingegen

ist die Stammzelle bei *Ph. guttata* [= *P. corylea*] nahezu unverzweigt. (2) Diese Pinselzellen . . . haben eine sehr merkwürdige Funktion. Sie dienen vermöge ihrer Quellbarkeit und daher kleisterartigen Beschaffenheit den halbreifen Fruchtkörpern als eine Art Anker, um dieselben au feuchten Gegenständen (Blättern) festzuheften und ein Zubodenfallen vor der vollständigen Reife der Sporen möglichst zu verhindern."

The independent attribution by Dr. Neger of the same function to these perithecial outgrowths as that given from the result of my own observations is very satisfactory, and the further full details promised by Dr. Neger—especially if they have been based on the study of living material—cannot fail to be of great interest. As to the validity of the branched or unbranched nature of the stalk-cell as a specific character, however, I have strong doubts. Fig. 3 shows a much-branched stalk-cell, and I find from my notes that this was drawn from a European specimen of *P. corylea* growing on *Betula alba*. As, however, Dr. Neger intends to publish very shortly the description and figures of *P. Clavariæformis*, it will, of course, be best to wait for these before discussing this question further.

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Explanation of Plate 403.—Fig. 1. Part of outermost wall at the base of the perithecium of *Phyllactinia corylea*, showing three outgrowths (young) from the external face of the cells, × 670. 2. Ditto, two outgrowths (old). (*a*) stalk-cell; (*b*) head of hyphal branches, mucilaginous and partly disorganised, × 670. 3. Single large outgrowth, with branched stalk-cell (from European specimen of *P. corylea* growing on *Betula alba*), × 670. 4. Apex of an outgrowth, at the stage when the walls of the hyphal branches are partly dissolved and invisible without staining; protoplasmic contents evident and resembling stalked spores, × 400. 5. End of one of the branches of the same, stained to show the very delicate wall, × 670. 6. Perithecium in vertical section, showing insertion of asci and dense mass of basal outgrowths, × 255. 7. Perithecium standing on the points of the appendages (from Tulasne, Sel. Fung. Carp. i. tab. 1, f. 2, left hand, top corner). 8. Perithecium (from Tulasne, *loc. cit.* f. 5 (reduced one-half)). 9, 10, 11. Branched cells in three stages of growth (from Tulasne, *loc. cit.* ff. 7, 8, 10). 12. "*Schinzia penicillata*" (from Nägeli, in Linnæa, 1842, tab. xi. f. 18). 13, 14. "Stalked cells" (from Bonorden, in Bot. Zeit. 1857, taf. iv. A, f. 6, *b*).

THE EARLY HISTORY OF INDIAN BOTANY.

By Sir George King, K.C.I.E., etc.

[By permission of the author, we reproduce the first part of the very interesting address delivered by Sir George King to the Botanical Section, of which he was President, at the recent meeting of the British Association at Dover. The second part, dealing with the history of Indian botany since 1848, is not reproduced, as the facts therein contained are more or less within the memory of the present generation of botanists.—Ed. Journ. Bot.]

The earliest references in literature to Indian plants are, of course, those which occur in the Sanskrit classics. These are, however, for the most part vague and obscure. The interest which these references have, great as it may be, is not scientific, and they may therefore be omitted from consideration on the present occasion. The Portuguese, who were the first Europeans to appear in India as conquerors and settlers, did practically nothing in the way of describing the plants of their Eastern possessions; and the first contribution to the knowledge of the botany of what is now British India was made by the Dutch in the shape of the *Hortus Malabaricus*, which was undertaken at the instance of Van Rheede, Governor of the territory of Malabar, which during the latter half of the seventeenth century had become a possession of Holland. This book, which is in twelve folio volumes and is illustrated by seven hundred and ninety-four plates, was published at Amsterdam between the years 1686 and 1703, under the editorship of the distinguished botanist Commelyn. Van Rheede was himself only a botanical amateur, but he had a great love of plants, and most

enlightened ideas as to the value of a correct and scientific knowledge of them. The *Hortus Malabaricus* was based on specimens collected by Brahmins, on drawings of many of the species made by Mathæus, a Carmelite missionary at Cochin, and on descriptions originally drawn up in the vernacular language of Malabar, which were afterwards translated into Portuguese by Corneiro, a Portuguese official in Cochin, and from that language finally done into Latin by Van Douet. The whole of these operations were carried on under the general superintendence of Casearius, a missionary at Cochin. Of this most interesting work the plates are the best part; in fact, some of these are so good that there is no difficulty in identifying them with the species which they are intended to represent.

The next important contribution to the botanical literature of Tropical Asia deals rather with the plants of Dutch than of British India. It was the work of George Everhard Rumph (a native of Hanover), a physician and merchant, who for some time was Dutch Consul at Amboina. The materials for this book were collected mainly by Rumphius himself, and the Latin descriptions and the drawings (of which there are over one thousand) were his own work. The book was completed in 1690, but it remained unpublished during the author's lifetime. Rumph died at Amboina in 1706, and his manuscript, after lying for thirty years in the hands of the Dutch East India Company, was rescued from oblivion by Professor John Burman, of Amsterdam (commonly known as the elder Burman), and was published under the title of *Herbarium Amboinense*, in seven folio volumes, between the years 1741 and 1755. The illustrations of this work cover over a thousand species, but they are printed on six hundred and ninety-six plates. These illustrations are as much inferior to those of Van Rheede's book as the descriptions are superior to those of the latter.

The works of Plukenet, published in London between 1696 and 1705, in quarto, contain figures of a number of Indian plants which, although small in size, are generally good portraits, and therefore deserve mention in an enumeration of botanical books connected with British India. An account of the plants of Ceylon, under the name *Thesaurus Zeylanicus*, was published in 1737 by John Burman (the elder Burman), and in this work many of the plants which are common to that island and to Peninsular India are described. Burman's book was founded on the collections of Paul Hermann, who spent seven years (from 1670 to 1677) exploring the flora of Ceylon at the expense of the Dutch East India Company. The nomenclature of the five books already mentioned is all uni-nominal.

Hermann's Cingalese collection fell, however, sixty years after the publication of Burman's account of it, into the hands of Linnæus, and that great systematist published in 1747 an account of such of the species as were adequately represented by specimens, under the title *Flora Zeylanica*. This Hermann Herbarium, consisting of six hundred species, may still be consulted at the British Museum, by the trustees of which institution it was acquired, along with

many of the other treasures possessed by Sir Joseph Banks. Linnæus's *Flora Zeylanica* was followed in 1768 by the *Flora Indica* of Nicholas Burman (the younger Burman)—an inferior production, in which about fifteen hundred species are described. The herbarium on which this *Flora Indica* was founded now forms part of the great Herbarium Delessert at Geneva.

The active study of botany on the binominal system of nomenclature invented by Linnæus was initiated in India itself by Koenig, a pupil of that great reformer and systematist. It will be convenient to divide the subsequent history of botanic science in India into two periods, the first extending from Koenig's arrival in India in 1768, to that of Sir Joseph Hooker's arrival in 1848; and the second from the latter date to the present day.

The pioneer John Gerard Koenig was a native of the Baltic province of Courland. He was a correspondent of Linnæus, whose pupil he had formerly been. Koenig went out to the Danish Settlement at Tranquebar (one hundred and fifty miles south of Madras) in 1768, and at once began the study of Botany with all the fervour of an enthusiasm which he succeeded in imparting to various correspondents who were then settled near him in Southern India. These friends formed themselves into a society under the name of "The United Brothers," the chief object of their union being the promotion of botanical study. Three of these brothers—*viz.* Heyne, Klein, and Rottler—were missionaries located near Tranquebar. Gradually the circle widened, and before the century closed the enthusiasm for botanic research had spread to the younger Presidency of Bengal, and the number of workers had increased to about twelve, among whom may be mentioned Fleming, Hunter, Anderson, Berry, John, Roxburgh, Buchanan (afterwards Buchanan-Hamilton), and Sir William Jones, so well known as an Oriental scholar. At first it was the custom of this brotherhood merely to exchange specimens, but gradually names began to be given, and specimens, both named and unnamed, began to be sent to botanists of established reputation in Europe. Many plants of Indian origin came thus to be described by Retz, Roth, Schrader, Willdenow, Vahl, and Smith. Rottler was the only member of the band who himself published in Europe descriptions of any of the new species of his own collecting, and these appeared in the *Nova Acta Acad. Nat. Curiosorum* of Berlin. A little later Sonnerat and other botanists of the French Settlement at Pondicherry sent large collections of plants to Paris, and these were followed at a considerably later date by the collections of Leschenault. These French collections were described chiefly by Lamarck and Poiret.

Hitherto botanical work in India had been more or less desultory, and it was not until the establishment in 1787 of the Botanic Garden at Calcutta that a recognized centre of botanical activity was established in British India. Robert Kyd, the founder of that garden, was more of a gardener than a botanist. He was, however, a man of much energy and shrewdness. The East India Company was still in 1787 a trading company, and a large part of their most

profitable business was derived from the nutmegs and other spices exported from their settlements in Penang, Malacca, Amboina, Sumatra, and other islands of the Malayan Archipelago. The Company were also in those days the owners of a fine fleet of sailing vessels, and the teak of which these ships were built had to be obtained from sources outside the Company's possessions. The proposal to found a Botanic Garden near Calcutta was thus recommended to the Governor of the Company's settlements in Bengal on the ground that, by its means, the cultivation of teak and of the Malayan spices might be introduced into a province near one of the Company's chief Indian centres. Kyd, as a Lieutenant-Colonel of the Company's engineers and as Secretary to the Military Board at Calcutta, occupied a position of considerable influence, and his suggestion evidently fell on no unwilling ears; for the Government of Bengal, with the promptitude to accept and to act on good advice in scientific and semi-scientific matters which has characterized them from the day of Kyd until now, lost no time in taking steps to find a site for the proposed garden. Colonel Kyd's official proposal was dated June 1, 1786, and, in a despatch dated August 2, the Calcutta Government recommended Kyd's proposal to the Court of Directors in London. Posts were slow and unfrequent in those days, and the Calcutta Government were impatient. They did not wait for a reply from Leadenhall Street, but in the following July they boldly secured the site recommended by Colonel Kyd. This site covered an area of three hundred acres, and the whole of it, with the exception of thirty acres which were subsequently given up to Bishop Middleton for an English college, still continues under cultivation as a Botanic Garden. Kyd died in 1793, and in the same year his place as Superintendent of the garden was taken by Dr. William Roxburgh, a young botanical enthusiast, and one of Koenig's "United Brotherhood."

Roxburgh had studied botany in Edinburgh, where he was a favourite pupil of Dr. Hope. Desirous of seeing something of foreign countries, he made several voyages to Madras in ships belonging to the Honourable East India Company. In 1776 he accepted an appointment in the Company's Medical Establishment, and was posted to the town of Madras, where he very soon made the acquaintance of Koenig. Roxburgh was shortly after transferred to a remote district, a good deal to the north of Madras, then named the Northern Circars. The station of Samulcotta, which formed Roxburgh's headquarters during his sojourn in the Circars, stands on the edge of a hilly region possessing a very interesting flora, and this flora he explored with the greatest ardour; and as part of the result of his labours an account of some of the most interesting of its plants was published in London, at the East India Company's expense, in three large folio volumes, under the title *The Plants of the Coast of Coromandel*. This was Roxburgh's earliest publication on a large scale. The first part of this book appeared in 1795, and the last not until 1819—*i.e.* five years after the author's death. The increased facilities afforded to Roxburgh

after his transfer to a comparatively well-equipped institution like that at Calcutta induced him at once to begin the preparation of descriptions of all the plants indigenous to British India of which he could procure specimens. And so diligently did he work that, when he was finally driven from India by ill-health in 1813, he left complete and ready for publication the manuscripts of his *Flora Indica* and of his *Hortus Bengalensis* (the latter being an enumeration of the plants in cultivation in the Calcutta Garden). He also left admirable coloured drawings (mostly of natural size) of two thousand five hundred and thirty-three species of plants indigenous to India. Seldom have twenty years yielded so rich a botanical harvest! Dr. Roxburgh was thus the first botanist who attempted to draw up a systematic account of the plants of India, and his book, which is on the Linnean system, is the basis of all subsequent works on Indian Botany; and, until the publication of Sir Joseph Hooker's monumental *Flora of British India*, it remained the only single book through which a knowledge of Indian plants could be acquired.

Roxburgh was immediately succeeded in the Calcutta Garden by Dr. Buchanan-Hamilton, a man of many accomplishments, who had travelled from Nepal in the north to Ava and Mysore in the south, accumulating materials for a Gazetteer of the Honourable Company's possessions. Dr. Buchanan was a zoologist as well as a botanist. He had published a valuable account of Mysore, Canara, and Malabar, and had collected materials for a work on the Fishes of India, besides having accumulated a large herbarium. part of which may now be consulted at the University of Edinburgh, Prior to his death Buchanan-Hamilton had begun to write a learned commentary on Van Rheede's *Hortus Malabaricus*. Many of his Nepalese collections were described in 1825 (a few years before his own death) by Don in his *Prodromus Floræ Nepalensis*.

Buchanan-Hamilton remained only one year at Calcutta, and in 1815 he was succeeded by Nathaniel Wallich, a native of Copenhagen, who, prior to his appointment to the Calcutta Garden, had been attached to the Danish settlement at Serampore, twenty miles higher up the Hooghly. Wallich remained Superintendent of the Calcutta Garden for thirty years. In 1846 he went to England, and in 1854 he died. During his tenure of office in the Calcutta Garden Wallich organized collecting expeditions to the then little-known regions of Kamaon and Nepal (in the Himalaya), to Oudh, Rohilkund, Sylhet, Tenasserim, Penang, and Singapore. He undertook, in fact, a botanical survey of a large part of the Company's possessions in India. The vast materials thus collected under his own immediate direction, and the various contributions made by others, were taken to London by him in 1828. With these were subsequently incorporated the collections of Russell, Klein, Heyne, Rottler, Buchanan-Hamilton, Roxburgh, and Wight; and by the help of a band of distinguished European botanists, among whom may be named De Candolle, Kunth, Lindley, Meissner, Nees von Esenbeck, Von Martius, and Bentham (the latter in a very special manner), this vast mass of material was classified and named

specifically. A catalogue of the collection was prepared by Wallich himself (largely aided by Bentham), and sets of the named specimens were distributed to the leading botanical institutions in Europe, every example of each species bearing the same number. No description of the whole collection was ever attempted, but many of the plants belonging to it were subsequently described in various places and at various times. So extensive was the Wallichian distribution that, amongst the names and synonyms of tropical Asiatic plants, no citation is more frequent in botanical books than that of the contraction "Wall. Cat." Besides the naming and distribution of this gigantic collection, Wallich prepared and published, at the expense of the same liberal and enlightened East India Company, his *Plantæ Asiaticæ Rariores*, in three folio volumes, with three hundred coloured plates. He also contributed to an edition of Roxburgh's *Flora Indica*, which was begun by the celebrated Dr. Carey, of Serampore, descriptions of many plants of his own collecting. But the task of publishing his discoveries in this way proved beyond his powers, as it would have proved beyond those of any one who had only three hundred and sixty-five days to his year, and less than a hundred years as his term of life! Carey and Wallich's edition of Roxburgh's *Flora Indica* was brought to an untimely conclusion at the end of the *Pentandria Monogynia* of Linnæus. Wallich also began an illustrated account of the Flora of Nepal under the title *Tentamen Floræ Nepalensis*. But this also came to a premature end with the publication of its second part.

During much of the time that Wallich was labouring in Northern India, Robert Wight, a botanist of remarkable sagacity and of boundless energy, was labouring in Southern India, chiefly in parts of the peninsula different from those in which Koenig and his band had worked. Wight was never liberally supported by the Government of Madras, and it was mostly by his own efforts and from his own resources that his collections were made and that his botanical works were published. The chief of the latter is his *Icones Plantarum*. This book consists of figures with descriptions of more than two thousand Indian species. A good many of the plates are indeed copies from the suite of drawings already referred to as having been made at Calcutta by Dr. Roxburgh. The rest are from drawings made, either by native artists under his personal supervision, or by his own hands. Ample evidence of the extraordinary energy of Dr. Wight is afforded by the facts that, although he had to teach the native artists whom he employed both to draw and to lithograph, the two thousand *Icones* which he published and described were issued during the short period of thirteen years, and that during the whole of this time he performed his official duties as a medical officer. Besides this *magnum opus*, Wight published his *Spicilegium Neilgherrense* in two volumes quarto, with two hundred coloured plates. And between 1840 and 1850 he issued in two volumes quarto, with two hundred plates, another book named *Illustrations of Indian Botany*, the object of which was to give figures and fuller descriptions

of some of the chief species described in a systematic book of the highest botanical merit, which he prepared conjointly with Dr. G. Walker Arnott, Professor of Botany in the University of Glasgow, and which was published under the title *Prodromus Floræ Peninsulæ Indicæ*. The *Prodromus* was the first attempt at a Flora of any part of India in which the natural system of classification was followed. Owing chiefly to the death of Dr. Walker Arnott, this work was never completed, and this splendid fragment of a Flora of Peninsular India ends with the natural order *Dipsaceæ*.

The next great Indian botanist whose labours demand our attention is William Griffith. Born in 1810, sixteen years after Wight, and twenty-four years later than Wallich, Griffith died before either. But the labours even of such devotees to science as were these two are quite eclipsed by those of this most remarkable man. Griffith's botanical career in India was begun in Tenasserim. From thence he made botanical expeditions to the Assam Valley, exploring the Mishmi, Khasia, and Naga ranges. From the latter he passed by a route never since traversed by a botanist, through the Hookung Valley down the Irrawadi to Rangoon. Having been appointed, soon after his arrival in Rangoon, surgeon to the Embassy to Bhotan, he explored part of that country and also part of the neighbouring one of Sikkim. At the completion of this exploration he was transferred to the opposite extremity of the northern frontier, and was posted to the Army of the Indus. After the subjugation of Cabul, he penetrated to Khorassan. Subsequently he visited the portion of the Himalaya of which Simla is now the best-known spot. He then made a run down the Nerbudda Valley in Central India, and finally appeared in Malacca as Civil Surgeon of that settlement. At the latter place he soon died of an abscess of the liver, brought on by the hardships he had undergone on his various travels, which were made under conditions most inimical to health, in countries then absolutely unvisited by Europeans. No botanist ever made such extensive explorations, nor himself collected so many species (nine thousand), as Griffith did during the brief thirteen years of his Indian career : none ever made so many field-notes or wrote so many descriptions of plants from living specimens. His botanical predecessors and contemporaries were men of ability and of devotion. Griffith was a man of genius. He did not confine himself to the study of flowering plants, nor to the study of them from the point of view of their place in any system of classification. He also studied their morphology. The difficult problems in the latter naturally had most attraction for him, and we find him publishing in the *Linnean Transactions* the results of his researches on the ovule in *Santalum*, *Loranthus*, *Viscum*, and *Cycas*. Griffith was also a cryptogamist. He collected, studied, and wrote much on Mosses, Liverworts, *Marsiliaceæ*, and Lycopods, and he made hundreds of drawings to illustrate his microscopic observations. Wherever he travelled he made sketches of the most striking features in the scenery. His habit of making notes was inveterate ; and his itinerary diaries are full of information not only on the botany

but also on the zoology, physical geography, geology, meteorology, archæology, and agriculture of the countries through which he passed. His manuscripts and drawings, although left in rather a chaotic state, were published after his death under the editorship of Dr. McClelland, at the expense of the enlightened and ever-liberal East India Company. They occupy six volumes in octavo, four in quarto, and one (a *Monograph of Palms*) in folio.

Another botanist of much fame, who died prematurely in 1822, after an Indian career of only nine years, was William Jack. In 1814–15 Jack accompanied Ochterlony's army to the Nepal terai. He was transferred in 1818 to the Company's settlement in Sumatra under Sir Stamford Raffles, and during the four years of his residence in Sumatra he contributed to botanical literature descriptions of many new genera and species which were published in his *Malayan Miscellanies*. His collections, unfortunately, were for the most part lost by an accident, but those which were saved are now in the Herbarium Delessert in Geneva.

Somewhat similar to Griffith in temperament and versatility was the brilliant Victor Jacquemont, a French botanist who, at the instance of the Paris Natural History Museum, travelled in India for three years, from 1829 to 1832. During this period Jacquemont collected largely in the Gangetic plain. He then entered the North-west Himalaya at Mussourie, explored Gharwal and Sirmur, ascended the Sutlej to Kanawar and Piti (at that time unexplored), visited Cashmir, and, returning to the plains, crossed Northern Rajputana to Malwa and the Deccan. He finally reached Bombay with the intention of returning to France. But at Bombay he succumbed to disease of the liver, brought on by hard work and exposure. His remains, after having lain in the cemetery there for fifty years, were, with that tender regard for the personality of her famous sons which France has always shown, exhumed in 1881, and conveyed in a French frigate to find a permanent resting-place in the place of Jacquemont's birth. Jacquemont's collections were transmitted to Paris, and his plants were described by Cambessedes and Decaisne, while his non-botanical collections were elaborated by workers in the branches of science to which they respectively appertained, the whole being published in four volumes quarto, at the expense of the French Government.

The roll of eminent botanists who worked in India during the first half of the century closes with the name of Thomas Thomson, who collected plants extensively between 1842 and 1847 in Rohilkund and the Punjab, and again still more extensively during a Government mission to the North-west Himalaya and Tibet which was continued from 1847 to 1849. During this period Dr. Thomson explored Simla, Kanawar, Piti, Cashmir, Ladak, and part of the Karakoram. His collections, which were large and important, were transmitted to the Botanic Garden at Calcutta, and thence in part to Kew. They formed no insignificant part of the materials on which the *Flora Indica* and *Flora of British India* were founded. Dr. Thomson also published an account of his

travels—an admirable book, though now jostled out of memory by the quantities of subsequently issued books of Himalayan travel and adventure.

About the year 1820 a second centre of botanical enterprise was established at Saharunpore, in the North-West Provinces. A large old garden near that important town, which had been originally founded by some Mahommedan nobles of the Delhi Court, was taken over by the Honourable Company, and was gradually put upon a scientific basis by Dr. George Govan, who was appointed its first superintendent. Dr. Govan was in 1823 succeeded by Dr. J. Forbes Royle, and he in 1832 by Dr. Hugh Falconer. Dr. Royle made collections in the Jumno-Gangetic plain, in the Lower Gharwal Himalaya, and in Cashmir. He was distinguished in the field of Economic rather than in that of Systematic Botany, his chief contribution to the latter having been a folio volume entitled *Illustrations of the Botany of the Himalaya Mountains*. His valuable labours as an economic botanist will be noticed later on. Hugh Falconer was an accomplished palæontologist who devoted but little of his splendid talents to botany. His great contribution to palæontology, the value of which it is almost impossible to over-estimate, consisted of his exploration and classification of the tertiary fossils of the Sewalik range. Falconer was transferred to the Calcutta Garden in 1842. He was succeeded at Saharunpore by Dr. W. Jameson, who explored the botany of Gharwal, Kamaon, and Cashmir, but who published nothing botanical, his chief energies having been devoted to the useful work of introducing the cultivation of the China tea plant into British India.

During the first half of the century a considerable amount of excellent botanic work was done in Western India by Graham, Law, Nimmo, Gibson, Stocks, and Dalzell, the results of whose labours culminated in the preparation by Graham of a List of the Plants of Bombay, which was not, however, published until 1839 (after his death); in the publication by Stocks of various papers on the Botany of Scinde; and in the publication by Dalzell in 1861 of his *Flora of Bombay*. It is impossible in a brief review like the present to mention the names of all the workers who, in various parts of the gradually extending Indian Empire, added to our knowledge of its botanical wealth. It must suffice to mention the names of a few of the chief, such as Hardwicke, Madden, Munro, Edgeworth, Lance, and Vicary, who collected and observed in Northern India, and who all, except the two last mentioned, also published botanical papers and pamphlets of more or less importance; Jenkins, Masters, Mack, Simons, and Oldham, who all collected extensively in Assam; Hofmeister, who accompanied Prince Waldemar of Prussia, and whose collections form the basis of the fine work by Klotsch and Garcke (*Bot. Ergebnisse der Reise Prinzen Waldemar*); Norris, Prince, Lobb, and Cuming, whose labours were in Penang and Malacca; and last, but not least, Strachey and Winterbottom, whose large and valuable collections, amounting to about two thousand species, were made during 1848 to 1850 in the higher ranges of the Kamaon and

Gharwal Himalaya, and in the adjacent parts of Tibet. In referring to the latter classic herbarium, Sir Joseph Hooker remarks that it is "the most valuable for its size that has ever been distributed from India." General Strachey is the only one who survives of the splendid band of collectors whom I have mentioned. I cannot conclude this brief account of the botanical labours of our first period without mentioning one more book, and that is the *Hortus Calcuttensis* of Voigt. Under the form of a list, this excellent work, published in 1845, contains a great deal of information about the plants growing near Calcutta, either wild or in fields and gardens. It is strong in vernacular names and vegetable economics.

MYCETOZOA FROM THE STATE OF WASHINGTON.

By Arthur Lister, F.R.S.

Mr. John Jackol, of the Washington State University at Seattle, has directed his attention to the Mycetozoa of that district during the last two years, and has submitted to me his collection, consisting of sixty-six specimens, representing eighteen species and three well-marked varieties. The chief interest attaching to these gatherings lies in their being, as I believe, the first that are recorded from the great North-west State of the Union. The list will no doubt be largely added to, for we miss representatives of several genera which we should expect to be not uncommon where the climate is apparently so favourable to their growth as in the State of Washington. The names of the species submitted are as follows:—*Leocarpus vernicosus* Link, *Lepidoderma tigrinum* Rost., *Comatricha obtusata* Preuss, *Lamproderma physaroides* Rost., *Cribraria aurantiaca* Schrad., *Siphoptychium Casparyi* Rost., *Trichia favoginea* Pers., *T. affinis* De Bary, *T. scabra* Rost., *T. varia* Pers., *T. contorta* Rost., *T. contorta* var. *inconspicua*, *T. fallax* Pers., *T. Botrytis* Pers. var. α *genuina*, var. δ *subfusca*, var. ε *munda*, *Hemitrichia clavata* Rost., *H. Karstenii* (Rost.) List., *Arcyria ferruginea* Saut., *Prototrichia flagellifera* Rost., *Lycogala miniatum* Pers.

Taken as a whole, the specimens show little or no variation from the regular types, and are mostly species inhabiting dead wood. Some of them, however, call for special remark.

Lamproderma physaroides is the only species of the genus represented, and of this there are thirteen gatherings. They vary somewhat in the size of the sporangia and in the length of the stalk, but are essentially the form we meet with in Europe.

The specimen of *Siphoptychium Casparyi* differs from gatherings in the eastern States of America and in Sweden in having the sporangia more free—that is to say, they are not so densely compacted. They resemble in this respect the var. *simplex* of the allied species *Tubulina fragiformis* Pers. The columella is also curiously branched in the upper part, instead of rising as a straight column

reaching to the apex of the sporangium, and connected by horizontal processes with the sporangium-wall; but it is a single gathering, and probably to some extent abnormal.

The specimen of *Trichia favoginea* has some free and scattered sporangia; but the elaters, 8 μ in thickness, and the spores with a broad border and narrow bands, are quite typical. *T. scabra* is precisely the form most commonly found in this country. *T. varia* appears to be as abundant at Seattle as with us. Mr. Jackol sends seven specimens with the slight variations in the structure of the sporangium-wall we are accustomed to meet with. There is one specimen of *T. contorta* var. α, with dark purple-brown sporangia, and with typical capillitium and spores. *T. contorta* var. *inconspicua* is represented by two gatherings; the sporangia are paler in colour than the last mentioned, and the elaters have the characteristic distinct and delicate close spiral bands. The specimen of *Hemitrichia Karstenii* is exactly like that of *T contorta* var. α described above, in every respect, except that the capillitium consists of a continuous web, and not of free elaters. *T. fallax* is evidently a common species at Seattle, as it is elsewhere; there are eight specimens showing some variation in the size and colour of the sporangia; the spores are minutely reticulate. *T. Botrytis* is represented by three of its forms: var. α *genuina* is fairly typical, but the elaters are not so rugged in the arrangement of the spiral bands as is usual; they approach those of var. ε. The two specimens of var. ε *munda* have the neat and close spiral bands on the elaters described in the notice of this form in Journ. Bot. for 1897, p. 216. Seven examples are sent of var. γ *subfusca;* these are of much interest as being identical with the type of *T. subfusca* Rex, from the Adirondack Mts., N.Y., named and described by the late Dr. Rex in Proc. Acad. Nat. Hist. Phil. 1890, p. 192, and issued by Ellis & Everhart, No. 2495, from material supplied by Dr. Rex. With the exception of the type specimens, we had not met with precisely this form before, and the number and constancy of Mr. Jackol's gatherings at Seattle support Dr. Rex's determination; but that it is entitled to specific rank more than either of the other varieties of *T. Botrytis* is not obvious.

Prototrichia flagellifera. Before Mr. Jackol obtained this species at Seattle, we had no record of its occurrence in the New World; it had been previously received only from Britain, Norway, Sweden, and Tasmania. Mr. Jackol has sent two gatherings: in one the sporangia are stalked; in the other they are sessile; they show perfect development, and the spiral thickenings on the threads of the capillitium are remarkably sharp.

THE MOSSES OF WEST LANCASHIRE.

By J. A. Wheldon and Albert Wilson.

From a bryological point of view West Lancashire (v.-c. 60) has hitherto been practically unexplored; and, so far as we can discover, there is no complete catalogue and very few isolated records of its mosses and hepatics. In the preparation of this list we have therefore been unable to derive much information from the records of the past.

The only published bryological notes we have found are some casual references to one or two species of interest in Mr. Geo. Stabler's articles on the "Mosses and Hepatics of Westmoreland" (*Naturalist*, 1896–7), and a short list of species found near Lancaster by Mr. W. P. Hamilton (*Naturalist*, 1898, page 28). This meagre literature is no doubt to be attributed to the remote and somewhat inaccessible nature of portions of the county. Extensive tracts, unapproachable by rail, appear to have been totally neglected by collectors. These secluded localities, however, yield many interesting plants which well repay the long and weary tramps necessary to secure them.

For botanical purposes West Lancashire may be very naturally and conveniently divided into three main divisions, each presenting marked differences as to surface, elevation, and geological formation.

1. The North Division is separated from the remainder of the vice-county by the river Lune as far as its junction with the river Wenning, beyond which this tributary forms the line of demarcation to the Yorkshire boundary. The strata represented are principally carboniferous limestone, Yoredale series, and millstone grit, with small tracts of Upper Silurian, coal measures, and Permian sandstone. Greygarth Fell, situated in the extreme north-east corner, reaches an elevation of 2200 ft., the highest in the vice-county. The coast-line presents alternations of sandy shore, muddy salt-marshes, and rocky cliffs. Its varied geological features, together with its numerous woods, scars, and crags, its hills and glens, its tarns, limestone pavements, and "pot-holes," constitute this by far the most interesting botanical district of the three, and to this diversity of situation it owes its rich flora. The portion of the vice-county south of the Lune is separated from Yorkshire by a line of lofty hills. The high road running south from Lancaster to Preston affords a convenient means of dividing this southern tract into the two sections, east and west.

2. The East Division consists largely of elevated, bleak, and barren moorlands, known as "fells," intersected by deep wooded glens, or "cloughs," each with its never-failing stream of sparkling water. These streams are derived from extensive spongy peat-beds, which latter are in turn fed by frequent rains and cloud-fog. The remainder of the division is less interesting, consisting of upland pastures, with some low land on the banks of the principal rivers. The strata are almost entirely of the Yoredale series (grits and

calcareous shales) and millstone grit, the highest point in the division, Wardstone (1836 ft.), being of the latter formation. There is no large area of scar limestone, as in the north, but there are small patches near Chipping and Whitewell. This division has no coast-line.

3. The West Division presents a marked contrast to those already dealt with. It consists of a nearly level plain, termed the Fylde (or garden), lying between the estuaries of the rivers Lune and Ribble. About midway it is intersected by the river Wyre. In no part does it reach an altitude of more than 130 ft. above sea-level, and usually only from 25 to 60 ft. The strata consist principally of Permian sandstone and Triassic marl, generally overlaid with glacial drift, and in the northern and central portions of the district are the scanty remains of what was formerly an immense peat moss. This has been extensively reclaimed, and the greater part of the division is now highly cultivated. The coast-line exhibits muddy salt-marshes and sand-dunes resembling those of South Lancashire (59) and Cheshire (58). These aboriginal features, however, are rapidly disappearing before the operations of the builder and agriculturist, and the extension of fore-shore improvements by various watering-places. To the north of Blackpool are low cliffs of glacial drift. The more interesting plants of this district are those of the dunes, salt-marshes, and peat mosses.

The following list will show the distribution of the species through these three main divisions; and, while indicating what has already been done amongst the mosses, will also disclose how much still remains to be accomplished. We have further subdivided the three main divisions briefly defined above into smaller botanical districts, in accordance with the drainage areas of the various rivers. Some of these latter are only partially explored, so we do not at present think it prudent to publish our work in this direction; but we take this opportunity of inviting other botanists to give some of their attention to this rather neglected Watsonian vice-county, and assist us in tracing the species of both Phanerogams and Mosses through these smaller sections. Specimens, local lists, or information as to published records will be thankfully received and acknowledged.

Frequently recurring names are thus contracted—Hamilton (H.), Stabler (S.), Wilson (Wi.), and Wheldon (Wh.). If no collector's name is mentioned, the record rests on the joint responsibility of the authors. Where a date follows a locality, it is presumed to be that of the first discovery or first public record of the plant for the vice-county. No doubt many of the commoner species have been observed long before the dates given, but, as nobody appears to have troubled to record them, we have given the earliest date we have been able to find where the occurrence of each plant is well authenticated or specimens are available for reference.

We have very cordially to thank Messrs. H. N. Dixon and J. E. Bagnall for much help in the determination or confirmation of the more critical Mosses; and we are also indebted to Messrs.

W. H. Pearson, M. B. Slater, and Symers M. Macvicar for kindly assisting us in the determination of the Hepaticæ.

Except for a few trifling deviations the sequence of species agrees with that of Dixon's *Student's Handbook of British Mosses* and the *Moss Exchange Club Catalogue of British Hepaticæ*.

Sphagnum cymbifolium Ehrh. Frequent on the mosses and fells. 1. Easegill and Greygarth Fell. 2. Longridge Fell, July, 1896, *Wh.* Calder Valley, Lower Bleasdale, Whitmoor, Hindburn, and Harris End Fell, *Wi.* Clougha and Udale. 3. Cockerham Moss, *Wi.*—Var. *congestum* Schpr. Rare. 2. Calder Valley, July, 1898, and Lower Bleasdale, *Wi.*—Var. *squarrosulum* N. & H. 2. Longridge Fell, July, 1896, *Wh.* Grizedale, *Wi.* 1. Between Caton and Borwick, *Wi.*—*S. papillosum* Ldb. Frequent on the fells. 2. Longridge Fell, June, 1898, *Wh.* Above Oakenclough, Whitmoor, and Upper Roeburndale, *Wi.* Udale. 3. Cockerham Moss, *Wi.*—Var. *confertum* Ldb. 2. Longridge Fell, July, 1898, *Wh.* Harris End Fell and Hindburn, *Wi.*—*S. molle* Sull. var. *Mulleri* Braithw. Rare. 2. Udale.—*S. rigidum* Schp. var. *compactum* Schp. Not common. 2. Whitmoor, Oct. 1898, *Wi.* Sparingly on north side of Longridge Fell, *Wh.* Some of our specimens approach the type, but none are strictly typical.—*S. tenellum* Ehrh. Rare. 2. Whitmoor, Oct. 1898, *Wi.* 1. Easegill.—*S. subsecundum* Nees. Rare. 2. Dolphinholme, March, 1897, and Longridge Fell, *Wh.* Lower Bleasdale, *Wi.* Clougha and Udale.—Var. *contortum* Schp. Common on the fells. 2. Longridge Fell, July, 1896, *Wh.* Oakenclough, Wolfhole Crag and Hindburn, *Wi.* Udale.—Var. *obesum* Schp. Rare. 2. Longridge Fell, July, 1898, *Wh.*—Var. *viride* Boul. 2. Ditches on Longridge Fell, July, 1898, *Wh.* Lower Bleasdale, near Garstang, *Wi.* Udale (a submerged form).—Forma *auriculatum*. Longridge Fell, *Wh.*—Var. *squarrosulum* Grav. 2. Longridge Fell, February, 1899, *Wh.*—*S. laricinum* Spr. Rare. 2. Wolfhole Crag, October, 1898, *Wi.*—*S. teres* Angstr. var. *subteres* Dixon. Rare. 2. Near Dolphinholme, March, 1897, *Wh.*—*S. squarrosum* Pers. Frequent in bogs. 2. Dolphinholme, March, 1897, *Wh.* Calder Valley and Barnacre, near Garstang, *Wi.* Clougha and Udale.—*S. acutifolium* Ehrh. Common on the fells and mosses, and found in all three divisions.—Var. *rubellum* Russ. Rare. 3. Cockerham Moss, Aug. 1898, *Wi.* Wolfhole Crag, *Wi.*—Var. *tenellum* Schp. Rare. 2. Udale, June, 1899.—Var. *purpureum* Schp. Frequent on the fells. 2. Longridge Fell, July, 1898, *Wh.* Upper Roeburndale and above Oakenclough, July, 1898, *Wi.* Udale and Clougha.—Var. *quinquefarium* Ldb. 2. Udale and Clougha, June, 1899.—Var. *arctum* Braithw. 3. Cockerham Moss, Aug. 1898, *Wi.*—Var. *læte-virens* Braithw. (Under this name we include a form which is undescribed by British authors, which Messrs. Dixon and Bagnall consider to be intermediate between var. *læte-virens* and var. *patulum*.) 2. Longridge Fell, June, 1898, *Wh.* Upper Roeburndale and Whitmoor, *Wi.* Clougha. 1. Easegill, *Wi.*—*S. fimbriatum* Wils. Rare. 2. Calder Valley above Oakenclough, July, 1898, *Wi.*—*S. intermedium* Hoffm. Very common and variable on the fells. 2. Longridge Fell, July, 1898, *Wh.* Whitmoor,

Harris End Fell, Lower Bleasdale, and Hindburn, *Wi*. Udale and Clougha. 3. Easegill and Greygarth Fell. — Var. *pulchrum* Ldb. Upper Roeburndale, Oct. 1898, *Wi*. This was not typical, but nearer the variety named than the type.—*S. cuspidatum* Ehrh. Common on the fells and mosses. 2. Longridge Fell, July, 1898, *Wh*. Lower Bleasdale, near Garstang, *Wi*. Udale. 1. Easegill. 3. Cockerham Moss, *Wi*. Ditch near Pilling, *Wh*.—Var. *plumosum* N. & H. 3. Cockerham Moss, Aug. 1898, *Wi*. Udale.—Var. *brevifolium* Ldb. 2. Longridge Fell, February, 1899, *Wh*.

Andreæa petrophila Ehrh. Very rare. 1. Sparingly on Silurian rocks near Leck Beck, Easegill, July, 1898, *Wi*. On grit rocks near the summit of Greygarth Fell.

Tetraphis pellucida Hedw. Not uncommon, especially on grit rocks, barren. 2. Kemple End, Longridge, July, 1898, and Caton, *Wh*. Wood, near Garstang, Lower Bleasdale, and Hindburn, *Wi*. Clougha and Udale.—*T. Browniana* Grev. Very rare or overlooked. 2. Trough Brook Ghyll, Clougha, 1881, *S*.

Catharinea undulata W. & M. Very common in all three districts, fruiting.—*C. crispa* James. Rare, by the side of mountain streams, male plants only. 2. Longridge Fell, February, 1899, *Wh*. Very fine and abundant in Udale.

Oligotrichum incurvum Ldb. Rare. 2. In several places on Longridge Fell, February, 1899, *Wh*. Middle Gill, Hindburn, at 900 ft., *Wi*. Barren in both localities.

Polytrichum aloides Hedw. Frequent in the East, rare elsewhere. 1. Silverdale, April, 1898, *Wi*. 2. Longridge Fell, *Wh*. Garstang, Calder Valley, Hindburn, and between Hornby and Lower Salter, *Wi*. Clougha and Udale. — *P. urnigerum* L. Not common. 1. Easegill, with fruit, July, 1898, *Wi*. 2. Longridge Fell, July, 1898, *Wh*. Hindburn, *Wi*. — Var. *humile* Wahl. 2. Summit of Jeffrey Hill, Longridge, July, 1898, *Wh*.—*P. alpinum* L. Rare ? 2. Hindburn, June, 1899, *Wi*. — *P. piliferum* Schreb. Frequent. 2. Fairsnape Clough, May, 1898, *Wi*. Calder Valley above Oakenclough and Hindburn, *Wi*. Jeffrey Hill, *Wh*. 3. Lytham and Fleetwood, *Wh*.—*P. juniperinum* Willd. Common in uncultivated places. 3. St. Annes, June, 1898, and Fleetwood, *Wh*. 1. Leck Fell, *Wi*. Woodwell, *Wh*. Easegill. 2. Longridge, *Wh*. — *P. strictum* Banks. Locally abundant on some of the fells. 2. Bleasdale Fell, July, 1898, *Wi*. Harris End Fell, Hindburn, and Wolfhole Crag, with fruit, *Wi*. Udale. 3. Cockerham Moss, *Wi*. 1. Easegill and Greygarth Fell. — *P. gracile* Dicks. Rare, perhaps overlooked. 3. Cockerham Moss, Aug. 1898, *Wi*. — *P. formosum* Hedw. Frequent in moorland woods and cloughs, often fruiting. 2. Dolphinholme, March, 1897, and Longridge Fell, *Wh*. Near Lancaster, *H*. Grizedale, near Garstang, and Hindburn, *Wi*. Udale and Clougha. 1. Easegill. — *P. commune* L. Very abundant in East and parts of North, and still occurs as a lingerer in West.

Pleuridium subulatum Rab. Rare. 1. Silverdale, April, 1898, *Wi*. —*P. alternifolium* Rab. Rare. 3. Near Blackpool, July, 1898, *Wh*.

Ditrichum homomallum Hpe. Common in East, but usually barren. 2. Calder Woods, Garstang, April, 1898, and Hindburn,

Wi. Longridge Fell, *Wh.* 1. Easegill, near Leck, *Wi.* These are the only localities in which we have found it with fruit.—*D. flexicaule* Hpe. Confined to the xerophilous rocks of North, where it is frequent, but always barren. 1. Silverdale, April, 1898, Warton and Easegill, *Wi.* Haweswater and Trowbarrow, *Wh.* Dalton Crag.—Var. *densum* Braith. 1. Trowbarrow, May, 1899, *Wh.*

Swartzia montana Ldb. Rare. 1. Easegill, Aug. 1898, *Wi.*; with fruit there June, 1899.

Seligeria pusilla B. & S. Rare. 2. Caton, Oct. 1898, *Wh.*—*S. recurvata* B. & S. Rare. 2. Caton, Nov. 1898, *Wh.*

Ceratodon purpureus Brid. Very abundant, and ranging from the coast-line to the summit of Greygarth Fell.

Dichodontium pellucidum Schp. Frequent in East, rare elsewhere. 2. Garstang, Jan. 1878, *Wi.* Banks of the Brock, Calder Valley, above Oakenclough, and Lower Salter in Roeburndale, all with fruit, *Wi.* Whitewell and Caton, barren, *Wh.*—Var. *fagimontanum* Schp. Near Galgate, May, 1898, *Wi.* Longridge Fell, *Wh.* — *D. flavescens* Ldb. Not uncommon by rivers and streams. 2. Near Lancaster, Aug. 1897, *H.* Hodder Valley, and by the Ribble, near Ribchester, *Wh.* By the Lune about Caton, Hulton, and Hornby, *Wh.* 1. Caton, *Wh.*

Dicranella heteromalla Schp. Very abundant in East and North, and fairly common in West.—*D. cerviculata* Schp. 3. Cockerham Moss, Aug. 1898, *Wi.* By a ditch near Pilling, *Wh.* 2. Lower Bleasdale, *Wi.*—*D. varia* Schp. Not nearly as common as it is in South Lancashire. 2. Near Garstang, Jan. 1878, *Wi.* 3. Blackpool, and by the Lune near Preesall, *Wh.* 1. Hornby, *Wh.* — *D. Schreberi* Schp. Rare. 2. Near Lancaster, *Hunt* (in Br. Moss Flora).—*D. squarrosa* Schp. Locally plentiful on some of the fells. 2. Calder Valley above Oakenclough, May, 1898, and Hindburn, *Wi.* Udale. 1. Easegill.

Dicranoweissia cirrata Ldb. Common in North and East, not always fruiting. 2. Lancaster, Aug. 1897, *H.* Tootle Heights and Chipping, with fruit, *Wh.* Between Hornby and Lower Salter, with fruit, *Wi.* 1. Leck and Capernwray, with fruit, *Wi.* Near Snatchems, *Wh.*

Campylopus flexuosus Brid. Common on the fells of North and East. 2. Longridge Fell, with fruit, July, 1896, *Wh.* Hazlehurst Fell, Bleasdale Fell, and Hindburn, *Wi.* Clougha and Udale. 1. Easegill and Greygarth Fell. — Var. *uliginosus* Ren. Rare, in wet bogs on the fells. 2. Calder Moors above Oakenclough, May, 1898, *Wi.*—Var. *paradoxus* Husn. 1. On tree trunks several feet from the ground, Halton, Sept. 1898, *Wh.* 2. Longridge Fell, very abundant, *Wh.* Calder Moors, above Oakenclough, and on Thrushgill Fell, Roeburndale, *Wi.*—*C. pyriformis* Brid. Frequent on the fells. 2. Bleasdale Fell and near Garstang, with fruit, Jan. 1878, *Wi.* Longridge Fell, fruiting, *Wh.*—*C. fragilis* B. & S. Frequent amongst the hills. 2. Longridge Fell, July, 1898, *Wh.* Thrushgill Fell and Claughton, *Wi.* 1. Bank of Leighton Beck, near Silverdale, *Wi.*—Var. *densus.* Near Lowgill, Hindburn, *Wi.*—*C. brevipilus* B. & S. Rare. 2. Clougha, 1881, *S.*

Dicranodontium longirostre B. & S. var. *alpinum* Schp. 2. Thrush-gill Fell, Oct. 1898, *Wi.*

Dicranum Bonjeani De Not. Not at all common. 1. Storrs Moss, Silverdale, April, 1898, and Borwick, *Wi.* Near Trowbarrow, *Wh.* 2. Garstang and Lower Bleasdale, *Wi.*—*D. scoparium* Hedw. Common, and frequently fruiting. — Var. *orthophyllum* Brid. 3. Lytham, March, 1897, St. Annes and Fleetwood, *Wh.* 2. Upper Roeburndale, *Wi.* Clougha. 1. Between Caton and Borwick, *Wi.* All barren.— Var. *spadiceum* Boul. (including *turfosum*). Rare, and only at considerable altitudes. 1. Greygarth Fell, at 2100 ft., July, 1898, Calder Valley above Oakenclough, and Wolfhole Crag, *Wi.* All barren.—*D. majus* Turn. Abundant in the cloughs and valleys of East. Rare elsewhere. 2. Dolphinholme, March, 1897, Caton, and Longridge Fell, *Wh.* Grizedale, near Garstang, Hindburn, and Brock Bottom, *Wi.* Udale. 1. Easegill.—*D. fuscescens* Turn. Locally plentiful on some of the fells. Barren. 2. Clougha! 1881, *S.* Upper Roeburndale and Hindburn, *Wi.* In addition to the ordinary form, a peculiar variety with tall stems densely matted with tomentum occurs on Clougha.—Var. *falcifolium* Braith. Rare. 2. Upper Roeburndale, *Wi.*

Leucobryum glaucum Schp. Common in damp places on the fells and mosses, always barren. 2. Lower Bleasdale, May, 1898, Grizedale and Roeburndale, *Wi.* 3. Cockerham Moss, *Wi.* 1. Silverdale, *Wh.* Easegill and Dalton Crag.

Fissidens exilis Hedw. 3. Blackpool, 1895, *Wh.* — *F. viridulus* Wahl. 2. Banks of the Wyre, Coat Walls, and Preesall, March, 1899, with fruit, *Wh.* — *F. incurvus* Starke. 2. Hedge-bank near Stonyhurst, Feb. 1899, *Wh.* — *F. bryoides* Hedw. Common, and fruits freely. 2. Sandholme, near Garstang, Jan. 1877, *Wi.* Near Mitton, Ribchester, and Lancaster, *Wh.* 1. Silverdale and Halton, *Wh.* 3. Cockerham, *Wi.* Preesall and St. Annes, *Wh.* — *F. adiantoides* Hedw. Common, except in West, and generally fruiting. 2. Lancaster, Aug. 1897, *H.* Grizedale and Oakenclough, *Wi.* 1. Haweswater, Warton Crag, and Borwick, *Wi.* Silverdale, *Wh.* Easegill and Greygarth Fell. 3. Sparingly among the coast sandhills, *Wh.* — *F. decipiens* De Not. Only noticed hitherto in the limestone tract of North. 1. Easegill, July, 1898, *Wi.* Silverdale, July, 1898, *Wh.*—*F. taxifolius* Hedw. Frequent, especially amongst the hills, where it fruits commonly. 1. Silverdale, June, 1898, and Skerton, *Wh.* 2. Hindburn, *Wi.* Caton and Stonyhurst, *Wh.* Udale.

Grimmia apocarpa Hedw. Common on rocks and walls in North and East, rare in West, if found there at all. 1. Silverdale, April, 1898. Warton, Easegill, and Greygarth Fell, *Wi.* Haweswater, Yealand, and Lindeth, *Wh.* Dalton Crag. 2. Longridge Fell, Lancaster Moor, Chipping, and Whitewell, *Wh.* — Var. *rivularis* W. & M. 2. By the Hodder, near Mitton, *Holt.* Several places in the Ribble, extending to within the tidal influence near Preston; and also frequent in the Lune and Hodder, *Wh.* Brock Bottom, *Wi.* 1. Leck Beck, *Wi.*—Var. *gracilis* W. & M. Leck Beck, Easegill, July, 1898, *Wi.* — *G. maritima*, Turn. Local. 1. Abundant

on rocks about Lower Heysham, Aug. 1898, *Wh.*—*G. pulvinata* Sm. General, on walls and stones.

Rhacomitrium aciculare Brid. Frequent by rills amongst the fells, fruiting. 2. Roeburndale River, Lower Salter, April, 1898, and Hindburn, *Wi.* Udale and Clougha. 1. Leck Beck, Easegill, *Wi.*—*R. fasciculare* Brid. Common in the hilly districts. 2. Longridge Fell, June, 1898, and stones by Dilworth Reservoir, *Wh.* Hindburn and Roeburndale, *Wi.* Udale. 1. Easegill and Greygarth Fell, *Wi.* On a silurian boulder near Borwick, *Wi.* — *R. heterostichum* Brid. Frequent on the fells. 2. Between Hornby and Lower Salter, April, 1898, and Hindburn, *Wi.* Walls on Longridge Fell, *Wh.* 1. Between Caton and Borwick, and Easegill near Leck, *Wi.*—Var. *alopecurum* Hub. 1. Easegill, Aug. 1898, *Wi.* 2. Upper Roeburndale, *Wi.*—Var. *gracilescens* B. & S. 1. Greygarth Fell, at 2100 ft., July, 1898, *Wi.*—*R. lanuginosum* Brid. 2. Lower Salter, April, 1898, Hindburn, and Wolfhole Crag, *Wi.* Longridge Fell, and by the Dilworth Reservoir, *Wh.* Clougha and Udale. 1. Easegill, Middlebarrow, and Warton Crag, *Wi.* Dalton Crag.—*R. canescens* Brid. Apparently rare. 1. Easegill, July, 1898, *Wi.* —Var. *ericoides* B. & S. 1. Easegill, July, 1898, *Wi.*

Ptychomitrium polyphyllum Fürnr. Frequent in the hill districts. 2. Near Garstang, Jan. 1877, *Wi.* Dilworth Reservoir, and walls on Longridge Fell, *Wh.* 1. Easegill.

Phascum cuspidatum Schreb. 3. Lytham Rifle Range, Nov. 1898, *Wh.* Garstang, *Wi.* 2. Near Preston, *Wh.* Lancaster, *Wi.*

Pottia recta Mitt. Rare. 3. Bare earth by roadside near Garstang, Feb. 1899, *Wi.* — *P. Heimii* Fürnr. Frequent along the coast. 3. Lytham !, 1892, *Yates* (*in herb. Miss Armitage*). Also at St. Annes, Fleetwood, Pilling, and Preesall Ridge, *Wh.* — *P. truncatula* Ldb. 3. Lytham, November, 1898, *Wh.* Garstang, *Wi.*—*P. littoralis* Mitt. 3. Banks of the Wyre near Knott End, March, 1899, *Wh.*—*P. minutula* Fürnr. 3. Lytham Rifle Range, November, 1898, and near Preesall, *Wh.*

Tortula ambigua Angstr. 3. Between Pilling and Cockerham, Dec. 1898, *Wi.* — *T. aloides* De Not. 3. Lytham, Nov. 1898, and banks of the Wyre near Coat Walls, *Wh.*—*T. muralis* Hedw. Common everywhere.—Var. *rupestris* Wils. Very common in the limestone districts, rare elsewhere. 2. Wall near Higher Hodder Bridge, June, 1898, Leagram and Whitewell, *Wh.* 1. Silverdale, Warton Crag, and Over Kellet, *Wi.* Yealand, *Wh.* Dalton Crag and Easegill.—*T. subulata* Hedw. Frequent on sandy banks, fruiting. 3. St. Annes, March, 1898, and other places on the sand-hills, *Wh.* 2. Stonyhurst, Ribchester, Redscar, and Longridge, *Wh.* Udale.—(Var. *subinermis* Wils.). A form intermediate between this variety and the type occurs on the banks of the Hodder, near Mitton, *Wh.*, and near Leck Beck, *Wi.*— *T. mutica* Ldb. Rare, and barren. 2. Near Lower Hodder Bridge, and by the Ribble below Stonyhurst, June, 1898, *Wh.* — *T. lævipila* Schwgr. Frequent on trees, and often stunted in growth, and not fruiting. 1. Halton, with fine fruit, July, 1898, and between Heysham and Lancaster in several places, *Wh.* Dalton Crag. 2. Caton, and between Chipping and

Whitewell, *Wh.*—*T. intermedia* Berk. Only seen on the limestone. Common in North. 1. Silverdale, April, 1898, Warton, Over Kellet, and Leck Fell, all fruiting, *Wi.* Yealand, with fruit, *Wh.* Easegill and Dalton Crag. 2. Leagram and Whitewell, *Wh.* — *T. ruralis* Ehrh. Rare, or overlooked? 1. Silverdale, June, 1898, *Wh.* 2. Near Whitewell, *Wh.* — *T. ruraliformis* Dixon. Abundant on the sand-hills in some parts of West, but always barren. 3. St. Annes, March, 1898, and also at Lytham, Fairhaven, Southshore, Fleetwood, and Preesall (Knott End), in the latter locality very sparingly, *Wh.*—*T. papillosa* Wils. Very rare and sterile. 1. Silverdale, *Nowell* (in Br. Moss Flora). On hawthorn, sparingly, near Heysham, *Wh.*

Barbula lurida Ldb. Rare. 2. By the Hodder opposite Stonyhurst, 1886, *Holt.* Redscar, Preston, *Wh.* 1. Tree roots by the Lune, Caton, *Wh.*—*B. rubella* Mitt. Common, especially amongst the hills. 2. Longridge!, 1881, *F. C. King.* Lancaster!, *H.* Garstang, *Wi.* Caton, *Wh.* 1. Capernwray, Silverdale, and Easegill, *Wi.* 3. Lytham and elsewhere on the sand-hills, *Wh.* — Var. *dentata* Braithw. 2. Longridge, July, 1898, *Wh.* 1. Greygarth Fell, at 2100 ft., July, 1898, *Wi.*—*B. tophacea* Mitt. Grows with us most frequently on damp clay or sand, more rarely on calcareous earth, as stated in books. Fruits freely. 3. Blackpool, July, 1898, Clevelys, Fairhaven, St. Anne's, Pilling, and banks of the Lune near Preesall, *Wh.* 2. Lower Salter, *Wi.* 1. Skerton, *Wh.* — *B. fallax* Hedw. Common. 1. Lindeth, June, 1898, *Wh.* Silverdale and Easegill, *Wi.* 2. Tootell Heights, Chipping, and near Ribchester, *Wh.* 3. St. Annes, *Wh.* — Var. *brevifolia* Schultz. 1. Middlebarrow, March, 1899, *Wi.*—*B. recurvifolia* Schp. 1. Silverdale and Warton, *Wi.* Lindeth, *Wh.*—*B. spadicea* Mitt. Not uncommon by streams. 2. Higher Hodder Bridge, March, 1898, *Wh.* Redscar, Preston, *Wh.* 1. Easegill, *Wi.* By the Lune, Caton, *Wh.* — *B. rigidula* Mitt. Rare. 2. Lancaster, Aug. 1897, *H.* 1. Leighton Beck, Silverdale, *Wi.* Caton and Halton, *Wh.* — *B. cylindrica* Schp. Not uncommon. 2. Caton, July, 1898, and below Longridge village, *Wh.* Garstang and Brock Bottom, *Wi.* 3. Pilling, *Wi.*—*B. vinealis* Brid. Frequent, especially on the sand-hills. 3. St. Annes, March, 1898, Southshore, Lytham, and Knott End, *Wh.* 2. Grizedale, near Garstang, *Wi.* Tootell Heights, *Wh.* —*B. revoluta* Brid. Very abundant in the limestone districts. 2. Hodder Valley, March, 1898, Chipping and Caton, *Wh.* 1. Capernwray, *Wi.* Heysham, Morecambe, and Halton, *Wh.* 3. Walls of Fleetwood Barracks, *Wh.* — *B. convoluta* Hedw. Common, but rarely fruiting. 2. Lancaster!, Aug. 1897, *H.* Stonyhurst, Caton, and Longridge, *Wh.* 3. Lytham, St. Annes, and Southshore, *Wh.* 1. Heysham, *Wh.*—(Var. *sardoa* B. & S.). Forms approaching this occur between Stodday and Galgate, *Wi.*, and near Mitton, *Wh.*—*B. unguiculata* Hedw. Very abundant, especially in West and North. First record Garstang, Jan. 1877, *Wi.*

Leptodontium flexifolium Hpe. Rare and barren. 2. Near Lancaster, Aug. 1897, *H.* 1. Greygarth Fell.

Weisia squarrosa C. M. 3. Coat Banks, Preesall, March, 1899, *Wh.*—*W. microstoma* C. M. 2. Whitewell, Aug. 1880, *F. C. King.*

1. In many localities in the vicinity of Silverdale, where it is common. 3. Preesall, *Wh.* —(*W. tortilis* C. M. Plants so named from the Silverdale district prove to be specimens of the next, which have lost the peristome through age.)—*W. crispata* C. M. Confined to the scar limestone of North, where it is abundant (see p. 375). Silverdale, April, 1898, Borwick and Warton, *Wi.* Rocks above Haweswater, Trowbarrow, Thrang End, and Yealand, *Wh.* — *W. viridula* Hedw. In every division, fruiting commonly on banks and hedgerows.—Var. *gymnostomoides* B. & S. 2. Near Mitton, *Wh.*—*W. rupestris* C. M. Locally abundant in parts of North and East, often fruiting. 2. Between Hornby and Lower Salter, April, 1898, and by the Roeburn, Lower Salter, *Wi.* Udale. 1. Upper Easegill and Greygarth Fell, *Wi.* By Leck Beck, near Leck.—*W. verticillata* Brid. Rare and barren. 2. By the Brock, Garstang, May, 1898, *Wi.*

Trichostomum crispulum Bruch. Not common, and apparently found only in the limestone areas. Always barren. 1. Morecambe Bay, July, 1898, Silverdale, and Yealand, *Wh.* Dalton Crag. 2. Above Greystoneley, *Wh.*—*T. mutabile* Bruch. Rare, and does not fruit. 2. Lancaster, Aug. 1897, *H.* 1. Silverdale and Lindeth, *Wh.*—Var. *littorale* Dixon. Rare. 1. Silverdale, April, 1899, *Wi.* —*T. flavo-virens* Bruch. Sparingly on the coast, a decreasing species. 3. St. Annes !, Aug. 1884, *J. Cash.* Lytham and Preesall, *Wh.* 1. Heysham Peninsula, *Wh.*—*T. nitidum* Schp. Common on the scar limestone, but always sterile. 1. Silverdale, June, 1898, *Wh.* Easegill, Leck Fell, and near Haweswater, *Wi.* Dalton Crag. 2. Leagram and Whitewell, *Wh.*—*T. tortuosum* Dix. Frequent on rocks and walls, especially in calcareous districts, never fruiting. 2. Lancaster, Aug. 1897, *H.* Hindburn, *Wi.* Leagram, *Wh.* 1. Silverdale and Warton, *Wi.* Trowbarrow and Thrang End, *Wh.* Easegill and Dalton Crag.—Var. *fragilifolium* Dix. 1. Silverdale, June, 1898, Trowbarrow and Thrang End, *Wh.* Over Kellet, *Wi.* Easegilll and Dalton Crag. 2. Above Greystoneley, Leagram, *Wh.*

Cinclidotus fontinaloides P. Beauv. Common and frequently fruiting in rivers and streams. 1 and 2. In the Lune above Lancaster !, Aug. 1897, *H.* Also in Hodder and Ribble, *Wh.* 1. Leck Beck and Leighton Beck, *Wi.*

Encalypta vulgaris Hedw. 1. Generally distributed in North, rare in the other divisions. First record, Silverdale, April, 1898, *Wi.* 2. Hodder Valley, *Wh.* 3. Near Pilling, *Wi.*—*E. streptocarpa* Hedw. Common on limestone rocks and walls, but not confined entirely to calcareous situations. 2. Tootell Heights, July, 1896, and Caton, *Wh.* Lancaster, *H.* Udale. 1. Halton, *Wh.* Silverdale, *Wi.*, and many other places. 3. Sparingly on dry banks on the sand-hills, between St. Annes and Southshore, *Wh.*

Zygodon viridissimus R. Br. Rare. 1. Between Heysham and Lancaster, Aug. 1898, and near Bare, *Wh.* Easegill 2. Between Crumpax and Chipping, and near Stonyhurst, *Wh.* 3. Cockerham, *Wi.* — *Z. Mougeotii* B. & S. Rare. Middlegill, Hindburn, June, 1899, *Wi.*

(To be continued.)

CRITICAL NOTES ON SOME SPECIES OF *CERASTIUM*.

By Frederic N. Williams, F.L.S.

(Continued from p. 315.)

107. C. elatum Tenore, Fl. part. Nap. i. 372 (1823); et Fl. Napol. iv. 236 (1830). The second reference is the authority cited in *Index Kewensis* and other works. Not mentioned by Grenier. I have examined the authentic specimens distributed by Huet du Pavillon, *Exs. Sic.* 1856, no. 501, and consider them as conspecific with *C. Biebersteinii* DC. The teeth of the capsule after dehiscence are plane and patent, not revolute at the margins; so that the plant cannot be referred to *C. tomentosum*, to which it was reduced as a variety by Gussone, *Fl. Sic. Prodr.* 530. Tenore says that it is intermediate between *C. Columnæ* and *C. grandiflorum*, and identical with *C. Sammianum* Ser. (1824), and that it is distinguished from *C. grandiflorum* by its more robust growth and by the tint of the somewhat larger leaves. Grenier, moreover, reduces *C. Sammianum* and *C. tenuifolium* to *C. Biebersteinii*. Nyman places the plant as a subspecies intermediate between *C. grandiflorum* and *C. Biebersteinii*. From typical forms of the latter it is distinguished by the larger lanceolate leaves, revolute at the margin, more deeply cut petals, and the hirsute (not thickly tomentose) covering of the calyx. I propose therefore to unite *C. elatum*, *C. Sammianum*, and *C. tenuifolium* Vis., under the name of *C. Biebersteinii* var. *italicum*.

108. C. Elbrusense Boiss. Fl. Orient. i. 729 (1867). A species founded on *Aucher-Eloy* exs. no. 4246. I examined these type-specimens in Boissier's herbarium at Chambésy. There are no duplicates in Herb. Kew., but I found there mixed with *C. Kazbek*, on the same sheet, Kotschy's *Pl. Pers. bor.* 1843, no. 498, which Boissier rightly distinguishes from *C. Kazbek* (for under this name Kotschy distributed the Persian specimens) and adduces to his species. *C. Meyerianum*, subsequently characterized by Ruprecht, if it is really annual, seems closely allied to this species.

Hab. N. Persia; the alpine districts of Hasartschal and Elamont, on the western spurs of the Elbruz range, only a few parasangs from the shore of the Caspian Sea.

109. C. elegans Fisch. in litt. ex DC. Prodr. i. 400 (1824). The specimens so named by Fischer, and sent by him to Seringe, were described in the *Prodromus* under the name of *Stellaria elegans*, which, however, is not to be distinguished from *C. trigynum*.

110. C. elongatum Bieb. Fl. Taur. Cauc. iii. 316 (1819). By Grenier reduced to a var. of *C. Davuricum*. By Ledebour taken up as the type (*α glabrescens*) of *C. nemorale* Bieb.; this latter being considered as var. *β villosa*. There are no specimens in Herb. Kew. Fischer's authentic specimens in herb. DC., under the name of *C. Caucasicum* are to be referred to this. Ledebour probably knew (or rather Fenzl) of *C. elongatum* Pursh, and this led him to select the other form as the name for the species. *C. elongatum* and *C. nemorale* are consecutive species in M. von Bieberstein's work, and a comparison of the descriptions shows the following points of difference in favour of the former:—Caulis rami elongati; folia

caulina semiamplexicaulia glabra margine ciliato-scabra læte viridia. Dichotomiæ rami maxime elongati patentissime bifariam pilosi; pedicelli tenuiores, fructiferi patentes interdum suberecti parcius pubescentes. Calyx glaber nitidus, sepala acuminata enervia margine vix membranacea. Petala angustius obcordata. Capsula calyce paullo longior nec duplo.

111. C. ELONGATUM Pursh, Fl. Amer. Sept. i. 321 (1814); Meehan, in Proc. Acad. Nat. Sci. Philadelphia, 1898, 18. The label on the original specimens collected by a Mr. Lewis reads: "Plains of Columbia, April 22, 1806." The following is a transcript of the original description:—"C. hirsutum; foliis linearibus internodiis longioribus divaricatis, pedunculis terminalibus elongatis 2–3-chotomis, bracteis oppositis ovatis, petalis emarginatis calyce acuto duplo longioribus, capsulis subglobosis; perenne." Clark and Lewis's plants have lately been unearthed and re-examined by Mr. Thomas Meehan, of Philadelphia. He says: "Modern collators give this as a synonym of *C. arvense*, but with the excellent specimen now in hand, it seems to be a good species. It is, not merely hirsute, but glandular-viscid in all its parts. Its remarkably long narrow leaves, very leafy nodes with short internodes, are characters which it does not share with any forms of *C. arvense* in our herbarium." I am afraid that these characters are scarcely distinctive enough to be of specific value in the absence of variation of floral structure, though they may constitute the specimens what might be considered a variety or state due to immediate œcological conditions. Beyond that, at present, without a critical examination of the specimens, one would not be prepared to go. As Willkomm says of the usual forms of *C. arvense*—"varietates constantes vix distingui possunt: in stationibus subalpinis et alpinis plus minus condensata, pauci- et grandiflora evadit." The characters mentioned by Mr. Meehan seem to fit very well specimens named *C. arvense* var. *angustifolium* Fenzl in Ledeb. Fl. Rossica, i. 413, a variety which is not uncommon in the United States. Pursh's plant is not referred to by Mr. B. L. Robinson in his review of the N. American species of *Cerastium*; but he says that broad-leaved and narrow-leaved specimens are forms strikingly different in their extremes, but rather freely intergrading and often difficult to distinguish, and in the latter the cauline leaves are much fascicled, and attenuate below towards the base.

112. C. ELONGATUM Vahl herb., in Herb. Mus. Paris., ex Gren., Monogr. Cerast. 39. These specimens are to be referred to *C. glomeratum*, though the stem is more branched, and the flowers somewhat more loosely disposed on longer peduncles. The root is certainly annual, otherwise it would be better to refer the specimens to *C. triviale*. Grenier says that he has seen similar specimens, springing up among lucerne, in fields near Besançon.

113. C. ENDRESSIANUM Prolongo, ex Willk. & Lange, Prodr. fl. Hisp. iii. 687 (1878); Colmeiro, Enum. pl. Hisp. Lusit. i. 443 (1885), syn.; Jacks. Ind. Kew. i. 484 (1893); Gürke, Pl. Europææ, ii. 228 (1899), syn. On these specimens, collected by Endress in the Pyrenees in September, 1829, Gay founded his *C. Pyrenaicum*.

The following is the translation of Endress's written label attached to the specimen :—" Between the rocks on the hilly slope of Nouria in the descent from the Col de Nouria, and at the Cume de la Grave in making for the valley from the lakes of Carlitte opposite the Pie de Carlitte." It is labelled by him " C. latifolium ? "

114. C. ERIOPHORUM Kit. in Schultes, Oesterr. Flora (ed. 2), i. 694 (1814) : = *C. alpinum*. A short diagnosis in German, of which the following is a Latin rendering :—Folia elliptico-lanceolata obtusa, inferiora ovata, lanata ; capsula calyce duplo longior. The original specimens were collected in the county of Liptau, in Hungary, on the Tatra Mountains. Rochel appears to have found the plant also in the Carpathians.

115. C. FALCATUM Ledeb. Fl. Rossica, i. 398 (1842). Syn. *C. maximum* var. *falcatum* Gren. Monogr. Cerast. 15 (1841)?? The usual reference given for this species is Bunge, *Verz. fl. Altaïc. suppl.* p. 37 (1836). On turning to this, however, only the *nomen nudum* is given, followed by two synonyms, *Stellaria falcata* and *C. lithospermifolium*. The former is certainly *Stellaria Davurica*, and the latter is not *C. lithospermifolium* of Fischer. To avoid the confusion likely to arise from basing the species on specimens wrongly referred to a previously described species, it will be more consistent as well as accurate to cite Ledebour as the authority. Here for the first time the plant is described, and the citations which follow Ledebour's description leave no doubt as to what specimens are included. No advantage accrues from citing an earlier reference, which, from the absence of a diagnosis, is indefinite and involved in obscurity.

116. C. FALLAX Guss. Suppl. Fl. Sic. Prodr. 139 (1832) ; Fl. Sic. Syn. i. 508 (1842). Authentic specimens from Gussone in Herb. Kew., dated 1833, with the following note in his handwriting :—" Petala linearia 2–3-dentata, calyce duplo breviora : pedicelli penduli capsulâ longiores : flores pentandri." There are also other and somewhat larger specimens from Reggio, in Calabria, and from the neighbourhood of Naples. The specimens are scarcely distinguishable (if at all) from English specimens of *C. pumilum ;* the plant is pale green, and the petals are scarcely bifid but subemarginate or 2–3-dentate, and much shorter than the calyx. There need be scarcely any doubt of referring it to this species ; nor is there any need of considering it even as a variety. The form also occurs in Spain and Algeria. In *Index Kewensis*, reduced to *C. semidecandrum*.

117. C. FASCICULATUM Bartl. in Presl, Reliq. Haenk. ii. 16 (1830). Mexican specimens, not to be distinguished from *C. arvense*, except that the lower internodes are shortened, so that the leaves are in closer pairs and almost fasciculate at the base.

118. C. FILIFOLIUM Vest, in *Flora*, iii. 353 (1820). The original description is :—" Perenne, cæspitosum. Caules filiformes, e basi prostrata adscendentes. Folia trigona. Pedicelli calycem æquantes, fructiferi erecti. Flores speciosi. Petala biloba, lobis obtusis, calyce duplo longiora." With difficulty distinguished from *C. banaticum*, but best reduced to *C. grandiflorum*, of which it may be considered a form with narrower leaves. The type-specimens were from Hohenschwab, in the Styrian Alps, near Mariazell.

119. C. FILIFORME Schleich. Cat. Pl. Helvet. (ed. 3), 11 (1815). Not mentioned in previous or subsequent editions of the catalogue. Schleicher collected the specimens in the Alps of Savoy. The specimens sent to Seringe are referred to in the *Prodromus* under the name of *C. ovatum* var. *filiforme*, with the note, "an species propria?" These are certainly identical with authentic specimens of *C. pedunculatum*, described by Gaudin in 1828. But the latter name cannot be displaced, as *C. filiforme* in Schleicher's Catalogue is not followed by any diagnosis.

120. C. FLACCIDUM Andrz. ex Trautv. in Act. Hort. Petropolit. viii. 155 (1883). Specimens collected in the government of Kieff, without precise locality.

121. C. FLEXUOSUM Hegetsch. in Suter, Fl. Helvet. (ed. 2) App. 454 (1822) : = *C. latifolium* var. *intermedium* Hegetsch. Reise, 150, fig. 22 et 25 (1825). Differs from normal specimens of *C. latifolium* in the broadly oval acute leaves, more crowded together, and in the short pedicels scarcely longer than the flower. Occurs in French Savoy and in adjacent localities over the Swiss border. A similar form with more glaucous leaves has also been described by Hegetschweiler under the name of *C. latifolium* var. *glaucum*.

122. C. FLOCCOSUM Benth. Pl. Hartweg. 162 (1839–48). A plant characterized by its dense woolly indumentum, found in the Andes of Ecuador and Colombia. The type-specimens are no. 906 of Hartweg's plants.

123. C. FONTANUM Baumg. Enum. Stirp. Transsilv. i. 425 (1816) : = *C. triviale* var. *fontanum* Rouy & Fouc. Fl. de France, iii. 207 (1896). This plant is identical with the var. *alpinum* and var. *alpestre*, a dwarf form with large flowers found on the Scotch mountains, and should supersede these names. The slightly different forms which may be united under the name given above are found in the Arctic regions and on the high mountains of Central Europe; from Iceland and the Faroë Islands southward to the Pyrenees and the Alps, and eastward to Kamtschatka and Alaska. Such specimens differ from the normal forms of *C. triviale* in the flowers nearly twice as large, the petals nearly twice as long as the calyx, and the proportionately longer capsule.

124. C. FRAGILLIMUM Boiss. Diagn. Pl. Nov. Or. ser. I. i. 54 (1842). A species of the *C. pumilum* group, allied to *C. densiflorum*, but with the flowers arranged in a loose dichasium. Boissier also describes a var. *brachycarpum*, a dwarf form with a short capsule, found in Anatolia.

125. C. FULVUM Rafin. "Précis de Découv. 36"; et ex Desvaux, Journ. Bot. iv. 269 (1814). This is *C. glomeratum*, as given in *Index Kewensis*, not *C. triviale* as stated by Mr. B. L. Robinson in his Revision of the N. American Alsineæ. The description as extracted by Desvaux from a tract, of which no copies appear to be obtainable, is as follows :—"Villosité roussâtre ; tige droite anguleuse; feuilles obtuses ; calice à folioles lancéolées, aiguës ; pétales égalant le calice ; capsule à 10 dents, sans nervure, penchée et arquée."

(To be continued.)

NOTES ON NORTH UIST PLANTS, &c.

By W. A. Shoolbred, M.R.C.S.

The following notes are the result of a short visit to North Uist in July, 1898. As I was able to explore some parts of the island which were left untouched during my former visit, in 1894, I can now add several plants to the list of those mentioned as observed in that particular island in my paper on the Outer Hebrides which appeared in this Journal in August, 1895. There are also one or two new records for v.-c. 110, which are marked by an asterisk. I have to thank Mr. Arthur Bennett, Mr. Beeby, Mr. E. G. Baker, the Revs. E. F. Linton and E. S. Marshall for kind help with some of the more critical forms.

Ranunculus Baudotii Godr. var. *marinus* (Arrh. & Fr.). Baleshare. — *R. sceleratus* L. Not uncommon on west coast. — *R. acris* L., var.? Some curious and interesting forms of a *Ranunculus* grow on the sandy pastures and sand-hills on the north and west coasts which Mr. E. G. Baker considers are probably forms or varieties of *R. borealis* Trautv.

Caltha palustris var. *Guerangerii* (Bor.). Not uncommon on the west side of the island. (Recorded for N. Uist from my 1894 specimens by Mr. Arthur Bennett in Ann. Scott. Nat. Hist. 1895, p. 241.)

Fumaria officinalis L. Tigharri, &c.

Arabis hirsuta Scop. ? var. In plenty on sand-dunes at Balranald and Newton. When growing this did not look quite like *A. hirsuta*, and I hoped it might prove to be Syme's var. *hispida* of *A. ciliata*, with specimens of which in the British Museum it agrees well, except in hairiness. It is exactly similar to the plant which Mr. Symers Macvicar has found in Coll, Tiree, Lismore, &c. (Ann. Scott. Nat. Hist. Jan. 1899). In my opinion it is a coast form of *A. hirsuta* analogous to the var. *confusa* Ehrh. of *Draba incana* L.

Erophila vulgaris DC. Balelone.

Cakile maritima Scop. West and north coasts.

Viola ericetorum Schrader. Sand-dunes near Newton; locally in some plenty. Not recorded for v.-c. 110 in last edition of Top. Bot. — *V. Curtisii* Forster. Sandy meadows, Balelone, Tigharri, &c. — *V. lutea* Huds. The beautiful large-flowered form, or rather state of this, common on the west coast of Benbecula, grows in profusion on blown sand at Kirkibost Island, together with an occasional plant of f. *amœna* and intermediates or hybrids between the two. Seed from the yellow form has germinated and grown freely. In cultivation it reverts to what appears to be an ordinary form of *V. lutea*. Only one or two seeds of the intermediate germinated, and subsequently died off.

Lychnis alba Mill. Not uncommon on the borders of fields and pastures on Vollay Island; only noticed previously on farm land at Balelone, where it was again seen. Perhaps introduced with grass or other seed.—*L. Githago* Lam. Coast, Hougarry Bay.

Cerastium tetrandrum Curt. Sand-dunes, north and west coasts.

Arenaria serpyllifolia L. var. **Lloydii* (Jord.). Balelone, &c.

Geranium dissectum L. Sandy coast meadows, Balranald; apparently very rare.

Ulex europæus L. Scolpeg, possibly native.

Trifolium pratense L. var. *maritimum* Marsson. Sand-hills, Kirkibost Island, &c.

Anthyllis Vulneraria L. var. *maritima* Schweigg. Coast sand-hills, Newton, Kirkibost, &c.

Vicia Cracca L. var. *incana* Thuill. Plentiful at Vollay and Kirkibost Islands.

Lathyrus pratensis L. Plentiful on Vollay Island.

Rosa tomentosa Sm. Cliffs east side of Lee Hills.

**Lythrum Salicaria* L. Mr. Mackenzie, of Balelone, showed me growing in his garden a specimen of this, which he had transplanted from the bank of a stream near the coast. I was unable to find the plant in a wild state myself, though I searched for it some time, but I have not the slightest doubt of the correctness of his statement.

Peplis Portula L. Ditches near west coast.

Epilobium palustre L. var. The narrow-leaved, much-branched form gathered in 1894 on the west coast of Benbecula I found growing at the mouth of a small rivulet at Tigharri.

Eryngium maritimum L. Sand-hills, Kirkibost and Baleshare Islands, rare.

Œnanthe Lachenalii C. Gmel. Rather plentiful in one or two places on the west coast.

Matricaria inodora L. var. *salina* Bab. West coast.

Hieracium Pilosella L. Sandy meadows, Baleshare. — *H. rubicundum* F. J. H. var. *Boswelli* (Linton). Cliffs, south Ben Lee.—**H. rivale* F. J. H. Cliffs, Lee Hills.—*H. murorum* L. pt. f. Cliffs east of Lee Hills.

Leontodon autumnalis L. var. *sordidus* Bab. (*fide* Ar. Bennett). Sand-dunes, Kirkibost Island. A very well-marked variety with large hairy leaves, a branched stem, and large handsome heads of flower having the involucres thickly clothed with greenish-yellow silky hairs, at first sight appearing more like a *Hypochæris*. Looking at this side by side with the glabrous small-headed form common in this part of the West of England, it is difficult to believe that they are both varieties of the same species.

Campanula rotundifolia L. var. *speciosa* More. This well-marked variety is plentiful on coast sand-hills at Balelone, Vollay Island, Newton, &c. The plants were mostly more luxuriant than those seen in Benbecula in 1894.

Erythræa Centaurium Pers. var. *capitata* Koch. ? Sand-hills and sandy pastures, north and west coasts, especially at Newton. A very pretty subcapitate form, in large specimens branching freely from the base, and having the sepals relatively longer than in *E. Centaurium*. The Rev. E. F. Linton considers that it does not differ in any way from var. *capitata* Koch. Mr. E. G. Baker writes he has been unable to match it with anything in Wittrock's

Erythrææ Exsic. in the National Herbarium; "in habit, shape of leaves, &c., it agrees with *Centaurium*, in length of sepals with *littoralis*." Mr. Arthur Bennett does not recognize it as any form with which he is acquainted.

Gentiana baltica Murb. Generally distributed, and in some places plentiful on the sand-hills, north and west coasts.

Myosotis repens D. Don. Bank of a stream near the foot of the Lee Hills.

Nonnea rosea Fisch. & Meyer? A casual in an oat crop at Baleloch. Mr. Baker tells me it is either this or a very closely-allied species.

Euphrasia borealis Townsend. Balranald, and Baleshare and Kirkibost Islands. — *E. Foulaensis* Towns. Baleshare Island and Ben Lee. — *E. brevipila* Burnat & Gremli. Near the landing stage at Tarbert, Harris.—*E. scottica* Wetts. Ben Lee.—*E. curta* Fries? Newton.

Mentha hirsuta L. Balranald Marshes, and stream and ditch-banks, Balelone.

Thymus Serpyllum Fr. var. *prostratum* Hornem. Coast sand-hills, Newton, &c.

Teucrium Scorodonia L. Very rare; only one or two small non-flowering plants seen on the rocky banks of a stream on the east side of the Lee Hills.

Plantago Coronopus L. var. A very beautiful form of this grows on sandy meadows on the west coast. Mr. E. G. Baker writes: "This comes nearest to var. *maritima* Gren. & Godr.; the largest specimen sent might almost pass as this variety, but the others seem too narrow."

Suæda maritima Dum. var. *procumbens* Syme. Kirkibost Island, &c.

Hippophae Rhamnoides L. Planted in gardens and by streams in a few places, and flourishing.

Corylus Avellana L. One small bush in a rocky gorge on the east of Ben Lee, decidedly native.

Listera cordata R. Br. Amongst thick heather at the foot of the North Lee.

Juncus Gerardi Lois. A curious dwarf form of this grows on the sandy coast at Kirkibost Island. — *J. balticus* Willd. Moist places between the sand-hills, Baleshare and Kirkibost Islands, &c.

Sparganium ramosum Huds. var. *microcarpum* Newman. Plentiful at Balranald Marshes.

Alisma ranunculoides L. Balranald Marshes; seen only at Loch Scolpeg in 1894.

**Potamogeton crispus* L. Small loch on Baleshare Island.

Zannichellia pedunculata Reichb. Ditches, Newton, &c.

Scirpus Tabernæmontani Gmel. Balranald Marshes. — *S. rufus* Schrad. Kirkibost Island.

Carex incurva Lightf. Two or three large patches on the shore of Kirkibost and adjoining islets, and on Baleshare Island. — **C. teretiuscula* Good. Plentiful at Balranald Marshes. — *C. paniculata* L. Very abundant in the same locality. — *C. binervis* Sm. var. *Sadleri* Linton. Cliffs, north Ben Lee. Since my note on the

occurrence of this variety in North Uist appeared in this Journal (1898, p. 442), I find there is in my herbarium a specimen of it from the same island, and in all probability from the identical station, gathered in 1894, which I had sent to Mr. Arthur Bennett as *C. binervis* (?), and of which he had written, "Yes, but simulating *C. frigida*."

Catabrosa aquatica Beauv. var. *littoralis* Parn. Kirkibost Island.

Poa pratensis L. var. *subcærulea* (Sm.). Common on the sand-hills.

Festuca rottbœllioides Kunth. Very plentiful on the sand-hills in several places on the north and west coasts.

Hymenophyllum unilaterale Bory. Cliffs on the east side of South Ben Lee.

Botrychium Lunaria Sw. One specimen in a crofter's garden at Clachan-na-ghluip.

Equisetum pratense Ehrh. Banks of a stream at the foot of the Lee Hills. Not recorded for v.-c. 110 in last edition of Top. Bot.

Chara vulgaris L. Balranald Marshes.

Nitella opaca Agardh. Lake at Tigharri.

During a few hours' stay at Portree, Skye, and at Strathcarron, West Ross, on my journey to and from North Uist, some few species and varieties were gathered which are, I believe, unrecorded for v.-c. 104 and 105 :—

Viola ericetorum Schrad. and *V. lutea* Huds. var. *amœna* (Symons). By the Carron River (105).

Euphrasia Foulaensis Towns. Near Portree (104).—*E. brevipila* Burnat & Gremli. Near Portree (104); Strathcarron (105).—*E. Scottica* Wetts. Near Portree (104).

Orchis latifolia L. Near Portree (104).

Scirpus rufus Schrad. var. *bifolius* Wallr. Portree (104). This appears to me to be a mere form or state of the plant, hardly worth a varietal name. Here, as in other places where I have seen it, it grew mixed up with the type and intermediates between the two.

Carex flava × *fulva*. Near Portree (104).

In 1894, two or three miles south of Oban, I gathered specimens of *Sambucus Ebulus* L. It grew in quantity by the side of a meadow at a distance from buildings. This, I believe, is a new record for v.-c. 98.

BIBLIOGRAPHICAL NOTES.

XXI.—Frasers' Catalogues.

In *Pittonia*, ii. 116–119 (1890) Prof. Greene reprints a very interesting Catalogue, the full title of which is:—"A Catalogue of New and Interesting Plants collected in Upper Louisiana, and principally on the River Missourie, North America, for sale at Messrs. Fraser's Nursery for Curious American Plants, Sloane Square, King's Road, Chelesea, London. 1813." This list was written by Nuttall, who has added his name in ink to the copy

from which Prof. Greene's reprint is taken, and it is frequently quoted by him in his *Genera of North American Plants*.

The majority of the names in this list are new. Many are mere *nomina nuda*, and as such have no claim to recognition, save in so far as they have been adopted by later writers; a few are sufficiently described; others have some indication of peculiarity which may or may not be sufficient for determination. On the strength of these names, changes of nomenclature have been made in recent American works, and it is of some interest to inquire how far in any case such a list can be recognized as a publication.

The Berlin rules expressly exclude trade catalogues, but the American rules do not pronounce upon this point. I venture to think that there should be a definite understanding on the matter, and that such catalogues should be excluded.

In the first place, such lists as the one now under consideration cannot be obtained through the ordinary channels. No bookseller has them on sale, nor can they be procured through him; they are mere broadsheets, not always even dated, likely to disappear altogether, or—which is worse—a solitary copy may be discovered very many years after publication, and this may furnish material for overturning existing nomenclature.

It cannot be said that this difficulty is altogether imaginary, for we have in the volume containing Walter's Herbarium (now preserved in the British Museum) a printed "list of seeds collected by [John Fraser] and brought home under his own care, and now in a very high state of perfection" which has many features in common with that reprinted by Prof. Greene: it bears no date, but was probably printed in the last decade of the last century. Fortunately the novelties indicated are not described, but it is by no means improbable that other of Fraser's lists may be accidentally preserved, and may contain material which has not hitherto been taken up by botanists. It was brought out by the original John Fraser, who died in 1811, and who therefore could have had no hand in the catalogue reprinted by Prof. Greene. This latter was issued by his two sons, John and James Thomas, who succeeded their father in the business; and the catalogue should be cited as "Frasers'"—not "Fraser's," as is done by Prof. Greene and other American writers.

Certain names in Frasers' Catalogue have not been taken up by those who consider such names should be adopted. For example, *missouriensis* Sims (1814) is retained for an *Œnothera* (*Megapterium*) published by Pursh in the same year as *macrocarpum*. But a comparison of Pursh's description with Nuttall's note on his *macrocarpum* in Frasers' Catalogue (1813) makes it clear that Pursh had the latter plant in view when describing his species; and Nuttall's type specimens in Herb. Mus. Brit. bear the names (in his hand) "macrocarpa" and "missouriensis"—the former being from the St. Louis locality named in Frasers' Catalogue and by Pursh.

The following notes on one or two of the names in the 1813 Catalogue may be worth printing:—

Sideranthus.

Prof. Greene says this name "will manifestly have to come to the front; not by virtue of its having been printed here, and credited with two species; for neither of the species is characterized. But when, a year later, Pursh described them as species of *Amellus*, they became recognizable. And immediately Rafinesque (Am. M. Mag. ii. 268) [1818] wrote and published them as types of a new genus, 'Sideranthus Fraser.' And this name, as dating from Rafinesque, supersedes *Chrysopsis*, *Aplopappus*, and I think every other genus to which either of the plants has ever been referred (*l.c.* 115)."

It may be worth while to bring together the references in botanical literature to *Sideranthus*, which I am inclined to think dates from Pursh's *Flora* (1814):—

Sideranthus integrifolius Fraser catal. 1813 ex Pursh Fl. Amer. Sept. ii. 750 (nomen) cum descript. l.c. 596 (1814).
S. pinnatifidus Fraser l.c. ex Pursh ll.cc.

Sideranthus Fraser ex Rafinesque in Amer. Monthly Mag. ii. 268 ex Greene ut supra, 1818.

"Sideranthus Fraser
integrifolius. vid. Amellus villosus.
pinnatifidus. vid. Amellus spinulosus."
Steud. Nomencl. 775 (1821).

"Sideranthus Fras.
villosus. Sideranthus integrifolius Fras. Amellus villosus Pursh.
spinulosus. Amellus spinulosus Pursh. Sideranthus pinnatifidus Fras."
Sweet, Hort. Brit. 227 (1826).

Sideranthus integrifolius Fras. ex Steud.
DC. Prodr. v. 327 (1836), under Chrysopsis villosa.
spinulosus Fras. ex Steud.
DC. l.c. 347 (under Aplopappus? spinulosus).

Sideranthus Nuttall* in Trans. Amer. Phil. Soc. vii. 301 (1841).

"Sideranthus [sphalm. Pideranthus] Fraser.
integrifolius Fras. Chrysopsis villosa.
spinulosus Fras. Sweet. Aplopappus spinulosus.
villosus Sweet. Chrysopsis villosa."
Steudel, Nomencl. ed. 2, ii. 580 (1841).

As will be seen from the above synonymy, the two species of *Sideranthus* represented the genera now generally known as *Chrysopsis* and *Aplopappus*. If we follow the American rule as to priority of place, there can be no doubt as to which *Sideranthus* is to be retained; for *S. integrifolius* stands first in all the above quotations, even when it is called *villosus*. The synonymy of the plant is:—

* "*Aplopappus spinulosus*, to which I applied the name of *Sideranthus* in Fraser's catalogue."—Nuttall, *l. c.*

Sideranthus integrifolius Fras. ex Pursh, l.c. 750 (1814).
Amellus villosus Pursh, l.c. 596.
Aster villosa Nutt. Gen. ii. 151 (1818).
Sideranthus villosus Sweet, l.c. (1826).
Chrysopsis villosa DC. Prod, v. 327 (1836) et auct.

Those who insist on the retention of the oldest specific name will adopt *Sideranthus villosus* Sweet.

The American botanists have not taken up *Sideranthus*, although Prof. Greene, as quoted above and in *Erythea*, ii. 75 (April, 1894), has urged its claims; but it is more surprising that, in spite of Prof. Greene's conclusive demonstration (*l.c*, 91) of its incorrectness, Dr. Britton quotes *Chrysopsis*, both in the *List of Pteridophyta* and in his *Illustrated Flora*, as of "Nutt. Gen. ii. 150 (1818)." Both *List* and *Flora* were published months or years after the publication of Prof. Greene's paper, but the facts therein set forth are ignored, and no explanation is given as to why Nuttall should be considered sponsor for a genus which he did not create. The author of the genus is of course Elliott (1824), to whom it is correctly attributed in Mr. Jackson's *Index*.

The second species of *Sideranthus* is generally known as *Aplopappus spinulosus* DC.; but Dr. Britton follows Prof. Greene in separating this and its allies from *Aplopappus*, and retains for them Nuttall's genus *Eriocarpum*. Dr. O. Hoffmann, however (Engl. Pfl. Famil. iv. 5, 151) retains these in *Aplopappus*. Whatever may be the case as to the North American plants, there seems no doubt that *Aplopappus* (1828) must be superseded by *Hoorebekia* (1817), as indicated by Mr. Jackson in his *Index*, where he enters under *Aplopappus*, "Hoorebekia, nomen princeps." The description by Cornelissen, with the accompanying figure, in Mussche's *Hortus Gandavensis* (1817), Mr. Jackson does not appear to have seen. Only those who adopt the fifty years' limit can refuse to substitute *Hoorebekia* for *Aplopappus;* the type species is *H. chiloensis* (not *chilensis*, as printed in DC. Prodr. v. 346) Cornelissen, *l. c.*

Agastache.

"*Hyssopus anethiodorus*. Both calyx and corolla blue." This extremely brief character is considered by Dr. Britton and Prof. Greene sufficient to distinguish the plant, and they have therefore revived the specific name as being the oldest. It may be noted, however, that Nuttall himself called it *anisatus*, and it has been so known until the recent revival. In his *Illustrated Flora* (iii. 84) Dr. Britton follows Dr. Otto Kuntze in adopting Clayton's name *Agastache* for the genus which Bentham published in 1821 as *Lophanthus*. Clayton's specimen confirms Dr. Kuntze's view that the plant called by Bentham *Lophanthus scrophulariæfolius* is the type of the genus. In the *List of Pteridophyta* (1894) *Agastache* was rejected, I know not for what reason, in favour of the much later *Vleckia* of Rafinesque. The not infrequent discrepancies between the *List* and the *Illustrated Flora* (even where the same author is responsible for both), while tending to the enrichment of synonymy, show that transatlantic nomenclature has not yet arrived at finality.

In view of the interest which attaches to such documents, it may be worth while to print in full the list by John Fraser to which reference has been made in the introductory portion of this paper. I have added a † in the margin to such names as I find attached to specimens in Walter's herbarium, as the *Flora of Carolina* seems to have had a close relation to the list. Unfortunately the herbarium suffered a good deal before it came into the possession of the Museum, and some of Walter's types are absent. It was presented to the Linnean Society in 1849, and was purchased by the Museum at the sale of the Society's surplus collections. Save for the addition of this sign and the addition of one footnote, I print the list exactly as it appears in the original :—

J. Fraser's Nursery, Sloane Square, Chelsea.

For the Introducing of Curious Plants and Seeds from America, and other different Parts of the World.

The following List of Seeds, collected by him, and brought home under his own care, are now in a very high State of Perfection ; those Ladies and Gentlemen who will do him the Honour to call and see them, he is convinced will be fully satisfied of the Fine State of Preservation they are in.

No.	*Names.*
1	Actaea, spicata
2	Æschynomene, grandiflora
3	——————— the same the Spaniards used to make a yellow dye of
4	Agrostis cornucopiæ, from seeds collected at Chelsea*
†5	Andromeda, arborea
†6	Andromeda, ferruginea
†7	——————— mariana*
†8	——————— nitida
†9	——————— racemosa
†10	——————— catesbœ [virens
†11	——————— arborea, semper-
†12	——————— paniculata
13	Annona, minor [plant
14	Anonymos, a beautiful shrubby
15	——————— ditto
16	——————— nova genera
17	———————
18	Apocynum, cannabinum
19	Aralia, spinosa
20	Asclepius's, of sorts
21	Aster, pilosa, fine plants for sale
†22	Azalia, coccinea arborea
23	——— minor
24	——— alba
25	Balsom fruit
†26	Bignonia, radicans
†27	——————— catalpa
†28	——————— crucigera
29	Borassus, flabellifera
30	Brunnichia, cirrhosa (Gærtner). This is a very curious plant ; neither plant nor seed of which was ever introduced into Europe before
31	Bryonia, striata (of Miller)
†32	Callycanthus, fertilis
33	Canna, coccinea
34	Cassia, of the Mountains
35	——— another specie
†36	——— chamachrista
37	Catesbœ, spinosa
38	Chelone, alba
39	Chionanthus, carolinienses
40	Chrysocomo, affinis*
41	——————— gigantea
†42	Cissampelos, smila cena*
43	Convolvulus, of sorts
†44	Cornus florida
45	Corrolodendron
†46	Crategus
†47	Croton, maritimum*
48	Cypress, deciduous
†49	Cyrilla, racemiflora
†50	Eryngium, aquatica
†51	Evonymus, Americanus
†52	Forsythia*
53	Fraxinus, excelsior*
54	——————— pubescens
55	——————— Americana

No.	*Names.*
56	Genera, nova, globosa radix
57	——————— of the large tree kind
58	Genera, nova, Odoratissim
59	——————— Graminifol
60	——————— Pilos
61	——————— Paniculat
62	——————— Ciliat
63	——————— a most beautiful plant
64	Gentiana, purpurea
65	——————— nova
†66	——————— saponaria
67	Gleditsia,* monispermum
68	——————— meliloba
†69	Glycine, frutescens*
70	———————
†71	Gnaphalium, undulatum
†72	Gordonia, lasianthus
†73	Halesia, tetraptra
74	———————
†75	Hamamelis
76	Hibiscus, palustris
†77	Hopea, tinctoria
†78	Hydrangea, radiata,* a beautiful new sort
79	Hysopis, nova
†80	Ilex, dahoon, latefolia
†81	——————— angustifolia
82	——————— variety
†83	——————— myrtifolia*
†84	——————— deciduous*
†85	——————— cassine
86	——————— rosemary folia
87	———————
88	Indigofera, caroliniana*
89	Ischæmum, secundatum*
90	Juglans, five or six sorts mixed
91	Juniperus, Bermudiana
†92	——————— Virginica
†93	Kalmia, hirsuta nova
†94	——————— latifolia
†95	Kuhnie,* affinis, nova genera
96	Lathyrus, six different species
†97	Laurus, barbona
†98	——————— melissifolia*
99	Lillium, caroliniensis
†100	Lobelia, cardinalis
101	———————
102	——————— ?
103	Lonicera, Virginica
†104	Magnolia,* Fraseri nova
105	——————— grandiflora
†106	——————— glauca
107	Mespilus, nova specie
†108	——————— arbutifolia
109	———————
†110	Mimosa, arborea
†111	——————— intsia
112	Mirtus, latifolia
113	Mitchella, macculated
†114	Myrica, cerefera
115	——————— latifolia
116	Nerium, oliander
117	Nut, ground
118	Nyssa, multiflora*
119	Nyssa, capitata*
120	——————— uniflora*
121	——————— biflora*
†122	Olea, Americana
123	Orchis, ophioglossoides
124	——————— beautiful orange-coloured
125	——————— yellow ditto
126	Palma, christi
†127	Passiflora, lutea
128	Phlomis
129	Phytolacca, decandra
134	Pinus, palustris, remarkable long leaves
135	——————— nova, and three other sorts
136	Plant, herbaceous, no name
137	Prinos, glaber
138	Pissimum plumb
139	Quircuss, thirteen distinct species of American
†140	Rhamnus, volubilis*
141	——————— a non descript (large tree)
†142	Rhexia
†143	Rhododendron, punctatum, (nova specie) a most beautiful plant; J. Fraser first discovered it in 1786. Dr. Smith of Great Marlborough Street, and Sir Joseph Banks had specimens of it.§
†144	——————— maximum
145	Rhus, from the mountains
146	Rosa, Carolina
147	Sapindus, saponaria
148	Scrophularia
149	——————— shrubs, a curious new one
150	Smilaxs, six different species
151	Soap, vegetable
†152	Sophora
153	——————— perfoliata*
154	Sperganum ?
†155	Staphylea, trifolia

* Vide Flora Car. 309.

§ [Specimens from Fraser are in the Banksian Herbarium. The species was published by Andrews (Bot. Repos. t. 36 (1798)), who states that Fraser introduced it "from the back settlements of Carolina" in 1792.]

No.	*Names.*
†156	Staehelina, elegans
†157	Stewartia, malacodendron
158	Styrax, officinale
159	——— læve
160	Syderoxylon, angustifolia
161	——————latifolia
†162	——————læve
163	——————altre species
164	Tatnall Grass, with a variety of other grasses from America
165	Trefoil (supposed)
166	Uniola, paniculata
167	Vaccinium, arborea
168	——————stamineum*
169	——————nova?
†170	Viburnum, nudum
†171	Walteriana, nova genera, a very beautiful evergreen shrub
†172	Yucca filamentosa*
173	——— gloriosa*
174	——— nova

Those marked * are to be found in Walter's Flora Carolina.

Living plants of the above Seeds, as well as Phloxes, New Magnolias, Rhododendrons, the Four distinct Species of Sarracenias, mentioned in Walter's Flora Carolina, Violets, &c, &c, many of which are not to be found, as yet, in any other person's possession but himself, will be ready for Inspection in a short Time; J. Fraser will give the earliest Information, as he intends to publish a General List of his Plants, as soon as they can be properly arranged. He is happy to inform the Nobility and Gentry, that it is now in his power to supply them with the most curious Plants and Seeds from all Parts of the World, on the most reasonable Terms; he has lately received valuable Collections of Seeds from Java and the Bahama's, a list, with their Native Names, is ready to be seen by any Person who will do him the Honour to call.

JAMES BRITTEN.

SHORT NOTES.

NOTE ON LINARIA.—It may be of interest to British botanists to note that Prof. Wettstein in his monograph of the *Scrophulariaceæ* in Engler and Prantl's *Pflanzenfamilien* (iv. Theil, 3 Abteilung, p. 57) divides *Linaria* into three genera: *Linaria* proper, with terminal inflorescence and valvular dehiscence; *Elatinoides*, with axillary inflorescence and porous dehiscence; and *Cymbalaria*, with leaves palmately veined. The two latter names are given for sections by Chavannes in his *Monographie des Antirrhinées* (1833); *Cymbalaria* was established as a genus by Baumgarten (*Enum. Stirp. Transsilv.* ii. 208 (1816)), who named the typical species *C. muralis*, and by Gray (*Nat. Arr. Brit. Pl.* ii. 321 (1821)), who called it *C. hederacea*. Mr. J. H. Barnhardt, in the *Bulletin of the Torrey Botanical Club* for July (p. 377), rightly points out that the name *Elatinoides* is antedated by Dumortier's *Kickxia*, published in 1827 in his *Flora Belgica* p. 35, and that the names of the two British species cannot stand as *Kickxia Elatine* Dum. and *K. spuria* Dum. if the genus be regarded as distinct from *Linaria*. In that case another name will have to be found for the Apocynaceous genus *Kickxia*, but it seems doubtful whether under any circumstances that can maintain the name. It was published as a *nomen nudum* by Blume in the preface to *Flora Javæ*, p. vii (1828), where it is spelt *Kixia*—a spelling retained by Endlicher, who first published it with a description in his *Genera*,

p. 586. This portion of the work was published in 1838,* and the name is antedated by *Kibatalia* of G. Don (Gen. Syst. iv. 86). The volume was published in parts—the preceding volumes were issued first in volumes and in parts afterwards†—and it is practically certain that *Kibatalia* was published in 1837; the preface to the volume is dated February, 1838. In any case, however, *Kickxia* of Dumortier antedates *Kixia* of Blume, and those who maintain the former as a genus must substitute *Kibatalia* for the latter.—James Britten.

Hierochloe v. Savastana.—Mr. Arthur Bennett, in his interesting account of *Hierochloe* in Scotland (Ann. Scott. Nat. Hist. Oct. 1899, pp. 230–235) does not refer to the name *Savastana* (Schrank, Baier. Fl. i. 100, 337 (1789)) which is adopted for the genus in the American Check-list and by Dr. Britton in his *Illustrated Flora*. It is certain that the original publication of *Hierochloe* by Gmelin in 1747 (Fl. Sibir. i. 101) cannot be cited, on account of its date, and Linnæus did not retain the genus, though he cites Gmelin's name as a synonym. Mr. Hiern, however, calls my attention to the use of the name by Ludwig (*Def. Gen. Pl.* ed. Boehm (1760), in a note under *Holcus*, p. 425): "*Hierocloë* (*sic*) Gmel. Sibir. tom. i. p. 101, huc refert Linn. Spec. tom. ii. p. 1048, differt floribus perfectis diantheris, masculis triantheris." Mr. Hiern thinks this is sufficient for purposes of citation, and that the genus should stand as *Hierochlöe* Gmel. ex Ludw. In the title of the paper in the Scottish *Annals* the name is printed throughout "*Hierochloa*," while in the paper itself "*Hierochloë*" is retained: is there any reason for this inconsistency? I note that Dr. Britton says of *Savastana*, "name unexplained." The explanation was given by Schrank when he established the genus; he named it in honour of an Italian Jesuit, Francesco Eulalio Savastano (1657–1717), who published a botanical work in Latin verse—*Botanicorum seu Institutionem Rei Herbariæ* Libri iv—in 1712.—James Britten.

Pyrus latifolia in N. Somerset (p. 408). — The tree to which Mr. Salmon refers is one which was planted, many years ago, in the grounds of Oakleigh House, near Keynsham, and therefore affords no material for a county record. As I have never had any communication with Mr. Salmon, I suppose he must have obtained specimens of the Oakleigh *Pyrus* from a correspondent to whom I sent some, long ago, informing him, I believe, at the same time, that they only represented a tree in cultivation. But it seems, from what Mr. Salmon says, that my label did not fully explain—as it should have done—the origin of the tree; hence the mistake into which he has been led.—David Fry.

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* I am indebted to Mr. B. D. Jackson for information as to the dates of Endlicher's *Genera*, which it may be well to place on record. Pp. 160 were issued in two parts in 1836; pp. 161–400 in three parts in 1837; pp. 401–636 in two parts in 1838; pp. 637—[probably 876]—in three parts in 1839; the remainder in 1840.

† See Loudon's *Gardeners' Magazine* xi. 194 (1835).

NOTICES OF BOOKS.

The Teaching of Botany.

The Teaching Botanist. A Manual of Information upon Botanical Instruction, together with Outlines and Directions for a Comprehensive Elementary Course. By William F. Ganong, Ph.D. 8vo, pp. ix, 270; figs. 29. New York: The Macmillan Co. Price 5s.

A Practical Introduction to the Study of Botany and Flowering Plants. By J. Bretland Farmer, M.A. 8vo, pp. viii, 274; figs. 121. London: Longmans. Price 2s. 6d.

Botany for Beginners. By Ernest Evans. 8vo, pp. viii, 290; figs. 271. London: Macmillan. 1899. Price 2s. 6d.

It is very evident that the teaching of botany in schools is of much greater importance in the United States than in our own country. Who in this enlightened land would dare to suggest a weekly course of four hours' practical work, an hour's demonstration, and an hour's lecture—in botany? Yet it is the possibility of such or similar courses which call forth so many excellent introductions to the science—books, for instance, like Prof. L. H. Bailey's *Lessons with Plants* and a manual like that by Prof. Ganong, now before us, for the guidance of actual or prospective teachers. The opening chapter—on the place of the sciences in education, and of botany among the sciences—is cheerful reading for the botanist, but would shock the average "head" or principal. It is not little consolation that the author seems to have gained much of his inspiration from Huxley's *Science and Education*. However, every teaching botanist, even if only an hour a week be the maximum space allotted or grudged, will do well to read carefully this excellent and highly suggestive little manual. It will not only help him to make the most of the short time at his disposal, but encourage him with the conviction that his work may be as truly educational and as generally useful as languages or mathematics, or any other branch of learning.

As indicated by the title, the book consists of two parts: Part I. "Essays on botanical pedagogics"; or, more simply—how to teach. Part II. "An outline for a synthetic elementary course"; or, what to teach. The first part comprises eight chapters, to the first of which we have already referred. In the second, "What botany is of most worth?" wisely insists on the advantage in an elementary course of commencing upon "objects already somewhat familiar, with clearly defined characters, and large enough to need no tools, but only the naked eye and hands"; and suggests the life cycle of an ordinary seed-plant from seed to seed. This may be followed by a general course in which a few representative members of *all* the large groups—Algæ, Fungi, Lichens, Bryophytes, &c.—may be studied. Other chapters deal with methods of recording results, including the importance of clear, but not elaborate, drawing; the equipment and arrangement of laboratories; botanical collections;

books and their use; and, finally, "on some common errors prejudicial to good botanical teaching."

The second part is a well-worked-out sketch of the two courses suggested in chapter ii. It is, of course, adapted for use in American schools; but the teacher on this side the Atlantic will find no difficulty in making such slight alterations as may be necessary in the material to be used for the work, or in a judicious selection if the time at his disposal does not allow of so full a treatment.

A practical introduction to botany adapted for students in elementary classes has hitherto been a desideratum. We have had useful text-books in which directions for practical work were included, but many teachers must have felt the want of a practical manual to do for their elementary class what Brewer's *Practical Botany for Beginners* did for the advanced. It is becoming generally realized that a study of the seed-plant which is primarily macroscopic, associated with a few simple physiological experiments, forms the best introduction to botany. The graduated study of the life-history of plant-types illustrating the great groups, and necessarily including much work with the microscope, will follow in the advanced course, to which there is no better practical guide than Brewer's book above mentioned.

Professor Farmer—as an examiner to the Science and Art Department, in accordance with the elementary syllabus of which we suppose the majority of elementary classes in this country are arranged—is peculiarly fitted to produce a practical introduction for beginners; and he has given us a useful and eminently workable little manual; and teachers will be especially grateful for the care with which throughout the commonest and most easily procurable plants have been selected for the work.

There are thirty-four chapters, arranged in four parts.

Part I., General Morphology, deals with the external form and structure of the stem, leaf, root, flower, fruit, and seed. The earlier chapters, on root and shoot, seem to us a little disjointed; we appreciate the impossibility of separating the study of the leaf from that of the axis which bears it, but the distribution of leaf-matter, so to speak, does not appeal to us as the best possible. Page 3, for instance, is early for the introduction of the intricacies of phyllotaxy.

Internal anatomy and minute structure are the subjects of chapters xv.–xxii., comprising Part II. The use of photographs of actual sections to illustrate the anatomy of stem and root is to be commended. The student has thus put before him a picture which he can realize in any decent section of his own, instead of the maddening ideal section to which he is treated in his text-book. Occasionally they are a little obscure (*e.g.* fig. 52), and in several (*e.g.* 40 A and 40 B) indicating letters and explanation are wanting.

Part III. (Physiology) contains five short chapters of directions for acquiring an experimental knowledge of the principal vital phenomena; a few simple pieces of apparatus, which can be fitted up at a slight expense, are described.

Part IV.—"Examples of natural orders of flowering plants"—includes the remaining chapters, which give a good idea of what the student must look for in representative species of the common British orders. We note with some surprise the insertion, under Cruciferæ, of the good old figure showing the stages in development of the embryo of Shepherd's Purse. This might well be left to a later stage; and, by the way, there is nothing to indicate the magnification of the figures.

There is a short appendix giving a list of apparatus required; a number of questions set at some elementary examinations; and an index. The last is not exhaustive.

Mr. Ernest Evans's little book has also been prepared as a guide to beginners in the practical study of plants, primarily with a view to the syllabus of the Science and Art Department. It combines the functions of text-book and practical guide, the second being fulfilled by the introduction of "experiments" in small type in the text. The latter are numerous, well selected, and well arranged, but, as must of necessity happen in a small book which has a double function to perform, are of the nature of terse directions, and leave much to be supplied in the way of explanation. The same remark applies to the text, which is in the form of notes from a fuller source of information, presumably the teacher's lecture. From this point of view—namely, the supplementing of other sources—the book is a useful one. It follows a very usual plan. The general morphology of root and shoot is first discussed; then internal structure; then came a few chapters on physiology; next the morphology and biology of flower, fruit, and seed is dealt with; and, finally, there are the chapters on classification. A feature of the latter is the description under each family of a well-known typical member, following which are notes on exceptional or differing cases. A number of illustrations have been borrowed, and duly acknowledged, from Strasburger's *Text-book*; others are new, and often inferior.

The Editor of the Journal calls my attention to the fact that *Botany for Beginners* is also the title of an elementary text-book by Dr. Masters, published in 1872, an eminently readable little book, vastly more interesting than its modern namesake, and practical withal, but not compiled with a view to examination of a Science and Art or any other department.

A. B. R.

The Flora of Tropical Africa. Vol. V. Part I. [*Acanthaceæ*. By I. H. Burkill and C. B. Clarke.] London: Lovell Reeve. Pp. 192. Price 8s. net.

We have examined with much pleasure this long-expected instalment of the *Flora of Tropical Africa*, and we earnestly trust that no further time will be lost in bringing out other parts, as this will greatly facilitate the labours of botanists interested in the flora of the African continent. But it would be idle to regard the work now once more set fairly going as in any way final, for much of

Africa still remains unexplored, and collections, each with its *quantum* of novelties, are pouring in so rapidly, that, in spite of its great usefulness, the *Flora of Tropical Africa* will doubtless have become antiquated before the twentieth century has advanced far on its way; indeed, owing to the delays which have interrupted its publication, the earlier volumes are already practically obsolete. How rapid has been the advance in this department of botany during the last half-century will be gathered from the few statistics now presented.

When the late Dr. Anderson wrote his monograph, in 1862 (Journ. Linn. Soc. Bot. vol. vii.), only two hundred and forty-five species of *Acanthaceæ*, distributed among forty-two genera, were known from the whole of the African continent and the adjacent islands. This, however, does not quite give a full estimate, for Dr. Klotzsch was working simultaneously at the order for Peters's *Reise nach Mozambique*, and the German savant's novelties naturally did not find a place in the English memoir. The authors of the present work, on the other hand, have to dispose of fifty-nine genera, and though it is possible here to enumerate only the species referred to forty-three of them—the rest of the memoir being yet unpublished—we find no less than five hundred and thirteen species mentioned in these pages. This shows that the order is now represented in the African tropics alone by considerably more than double the number of species known when the last general monograph on the subject appeared. These striking results are due to the labours of a large number of travellers. among whom may be specially mentioned Meller, Welwitsch, Hildebrandt, Schweinfurth, Whyte, Buchanan, Scott Elliot, Holst and Mechow. Thanks to these and other explorers, the species of *Thunbergia* have advanced in number from seventeen to fifty-nine, those of *Barleria* from twenty-eight to seventy-nine, of *Lepidagathis* from nine to twenty-five, and so on in proportion; while *Petalidium*, in Anderson's time scarcely known, and *Neuracanthus*, not known at all as African, are now found to be best represented in the "dark" continent.

For the earlier genera, from *Afromendoncia* to *Brillantaisia* inclusive, Mr. Burkill is responsible: the bulk of the work has thus fallen to Mr. Clarke, and right worthily have both botanists acquitted themselves. Nor would it be right to omit here the name of Dr. Lindau, who has won for himself so honourable a position by his laborious investigations into the pollen of these plants; and though Mr. Clarke is frequently at variance with him—more often than not, however, on questions merely of nomenclature—we are not sure that the German savant does not sometimes come out "on top," *e.g.*, with regard to the genus *Pseudoblepharis*. On the other hand, we think Mr. Clarke right in discarding *Pseudobarleria*, for the use of which we never could see sufficient warrant, and we approve his neglect of pollen characters in the case of so "natural" a genus as *Justicia*.

We have noticed a few—though only a few—oversights, such as must inevitably occur in a work of any magnitude. Thus *Petalidium linifolium* T. And. has been omitted; the authority

for *Neuracanthus africanus* is Anderson, and Lindau was not the first writer to use the name *Dyschoriste Hildebrandtii*. We may mention incidentally that *Blepharis Bainesii*, described from a scrap at Kew imperfectly localized as from the "South African Goldfields," and thus rightly introduced into the flora with a query, is undoubtedly a tropical plant, fine specimens of it being in Dr. Rand's Rhodesian collections, lately received at the British Museum. We should also like to know why *Hiernia* is regarded as "of uncertain position" in an order into which such abnormal genera as *Thunbergia*, *Afromendoncia*, and *Nelsonia* are admitted without remark. Our original location of *Hiernia* was among the *Nelsonieæ*; and, though it undoubtedly has some peculiar characteristics, subsequent examination of good material at the British Museum has served only to confirm us in this idea.

S. M.

Two Reprints.

We have already mentioned in these pages the reprints of the third edition of *English Botany* and of Anne Pratt's *Flowering Plants and Ferns of Great Britain*. Of the former we have received a detailed prospectus, and of the latter three or four numbers, so that we are able to form some opinion as to the manner in which they will be executed. In view of the frequently misleading because uninformed reviews of popular scientific works which appear in daily newspapers—not excluding *The Times*—and country journals, it seems worth while to give a brief appreciation of each, for the benefit of the British botanists who may be attracted by the comparatively cheap rate at which the books are offered.

Of *English Botany* a mere reprint is to be issued. This wil include the Supplement, so far as that was published, and also the unnecessarily elaborate index which Mr. N. E. Brown prepared for the whole work; but the Supplement only goes as far as *Dipsaceæ*, and the bulk of the work was practically completed thirty years ago, so that it by no means accurately represents the present state of our knowledge of the British flora, especially in critical genera.

With regard to the plates, judging from the specimen we have received—*Atriplex Babingtonii*—we fear that the extremely unsatisfactory colouring which marred Dr. Boswell Syme's edition will be perpetuated in this reprint: it would appear that the present colouring has been taken from the third edition, instead of from the original issue of the plates, and, if this be so, it is not surprising that, as in the instance before us, the defects should be exaggerated. One can hardly blame the present proprietors for sounding the praises of their wares, but the prospectus contains statements—*e. g.* that "*Sowerby's English Botany* has been universally accepted for nearly a century as the chief authority on descriptive English botany"—which must be considered hyperbolical. The thirteen volumes are not dear at £16, but if it had been possible to reprint the text in a single volume, omitting the very unsatisfactory "popular" portion and issuing the plates separately, we think a more satisfactory result would have been obtained. As a book of

reference, however, in spite of its incompleteness and other drawbacks, the work will always be useful.

We have already said (p. 336) that we were unable to accept Messrs. Warne's high estimate of their reissue of Miss Pratt's book, and that Mr. Step's editing and revision were not altogether successful; but we certainly expected better things from him. Mr. Step, although he has never shown any indication of anything approaching a critical knowledge of British plants, is a favourable specimen of the popular writer upon them. He is probably not accountable for the decision to reprint in full the curiously belated text, with its references to persons long since dead as if they were still among us, and its early Victorian verses, "written for our volume by Mary Isabella Tomkins" and other poets of equal note. There was not much in the botany which needed correction, for Miss Pratt was a careful compiler, and the scientific part of her book does not occupy much space; but there is hardly any attempt to bring the volume up to date: it practically stands as it stood when it was first issued in 1855.

The great defect of the book is in its incompleteness, an illustration of which may be taken from the first order that comes to hand—the *Gentianaceæ*. The text throughout is here reproduced almost without alteration, and it would seem without examination—for example, we are still told that "modern physicians find" that "*Gentiana microphylla*" "has soporific properties, and has been used in many instances in procuring sleep for the weary sufferer," although the only *microphylla* recorded in the *Index Kewensis* is a synonym of the Ecuadorean *G. sedoides*, of the medicinal use of which we do not find any record. *Cicendia pusilla* (which Mr. Step calls "*pusillum*") is added, but we find no reference whatever to *Gentiana germanica* or *G. baltica*, nor to the remarkable form of *Erythræa capitata*, one of the most interesting of recent additions to our flora. *E. latifolia*, by the way, is still stated to occur "in various places near the sea"; it is practically certain that Miss Pratt's "*latifolia*" included, if it was not confined to, a form of *Centaurium*, while the true *latifolia* seems to have been extinct for many years.

The conspicuous alterations are not improvements. For example, the "English" now precedes the Latin name in the descriptions, so that "Gentianella"—a name in frequent popular use for *Gentiana acaulis*—stands as the prominent title for *Cicendia*. Such names as "*Pneumonanthe*" and "*Centaurium*" are now spelt with small initials.

Miss Pratt's book was useful when it first appeared, but it is hopelessly belated in style and in knowledge; it would be easier to write a new book—for which we think there is room—than to bring this one up to date. Mr. Step might possibly be able to produce a popular handbook of British plants, if he were sufficiently acquainted with the literature of the subject to refer his readers to sources whence they could draw more complete information; but his edition of *The Flowering Plants of Great Britain* is entirely inadequate as a representation of the British Flora at the close of the nineteenth century.

*ARTICLES IN JOURNALS.**

Ann. Scott. Nat. Hist. (Oct.). — J. W. H. Trail, 'Florula of waste ground at Aberdeen.' — Arthur Bennett, *Hierochloe* in Scotland.

Bot. Centralblatt (Nos. 40–45).—W. Rothert & W. Zalenski. 'Über eine besondere Kategorie von Krystallbehältern.'—(No. 40). F. W. Neger, 'Zur Kentniss der Gattung *Phyllactinia*.'—(Nos. 41–45). M. Britzelmayr, 'Revision der Diagnosen von Hymenomyceten-Arten.'—P. Sorauer & E. Ramann, 'Sogenannte unsichtbare Rauchbeschädigungen.'

Bot. Zeitung (16 Oct.).—H. Molisch, 'Ueber Zellkerne besondere Art' (1 pl.).

Botaniska Notiser (Häft 4 : 15 Sept.).—C. A. Hansson, 'Spridda bidrag till vår Flora.' — T. Vestergren, 'Verzeichnis nebst Diagnosen und kritische Bemerkungen zu meinen Exsiccatenwerke Micromycetes rariores selecti.'

Bull. de l'Herb. Boissier (30 Sept.). — A. Chabert, 'Villars d'après sa correspondence de 1805 à 1814.'—E. Hackel, 'Enumeratio Graminum Japoniæ.'—F. Stephani, 'Species Hepaticarum' (cont.).—J. Foucaud, '*Trisetum Burnoufi*.'—R. Chodat, 'Plantæ Hasslerianæ' (cont.).—P. de Palézieux, 'Blatt der Melastomaceen' (cont.).

Bull. Torrey Bot. Club (22 Sept.).—H. M. Richards, 'Effect of Chemical Irritation on the Economic Coefficient of Sugar.'—A. Nelson, 'New Plants from Wyoming.' — O. Kuntze, '1737 as Starting-point of Nomenclature.'—S. M. Tracy & F. J. Goule, 'New Mississippi Fungi.'—E. P. Bicknell,' Studies in *Sisyrinchium*.'

Gardeners' Chronicle (23 Sept.)—W. Roberts, 'John Stackhouse.' —(4 Oct.). G. Massee, 'Fungus parasite on Aloe' (*Montagnella maxima*, sp. n.).

Journal de Botanique ("Juin": received 11 Oct.).—A. de Joincy, 'Plantes nouvelles de la flore d'Espagne.'—P. van Tieghem, 'Sur les genres Actinidie et Sauravie.'—L. Gaucher, 'La racine des Euphorbes cactiformes.'—J. Amann, 'Application de la loi des grands nombres.'—A. Franchet, 'Plantarum sinensium' (*Castanopsis*).

Oesterr. Bot. Zeitschrift (Oct.) — A. Jenčič, 'Einige Keimversuche mit Samen hochnordischer Pflanzen.'—J. Rick & H. Zurhausen, 'Zur Pilzkunde Vorarlbergs.'— F. Sauter, 'Funde seltenerer Phanerogamen in Ost- und Mitteltirol.'—K. v. Dalla Torre, 'Die Verbreitungsweise von *Crocus albiflorus*.'

Rhodora (Oct.).—M. L. Fernald, 'Undescribed and little-known varieties of *Aster* and *Solidago*.'

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

BOOK-NOTES, NEWS, &c.

We have received the first number of a new Brussels publication entitled *Icones Selectæ Horti Thenensis*, to be devoted to plants which have flowered in the collections of M. van den Bossche at Tirlemont. The descriptions are by Dr. de Wildeman, and the excellent plates by M. d'Apreval. The present instalment contains figures and descriptions of *Hakea suaveolens* Br., *Trymalium Billardieri* Fenzl, *Muraltia mixta* DC., *Agathosma villosa* Willd., and *Oxalis Ortgiesi* Regel.

The *Report and Transactions of the South Eastern Union of Scientific Societies for 1899* contains an interesting "Botanical Bibliography of the South-eastern Counties" by Mr. Boulger which is a revision and extension of Dr. Trimen's "Bibliography" (published in this Journal for 1874) so far as the counties of Hants, Kent, Middlesex, Surrey, and Sussex are concerned.

George Dowker, F.G.S., who died suddenly at Ramsgate on Sept. 22, was born at Margate on April 2, 1828. He was well known as a naturalist and antiquary, and especially as a geologist, and paid some attention to local botany; he conducted a botanical party to the Sandwich dunes during the recent meeting of the British Association at Dover, from which he only returned on the day of his death. In 1870 Mr. Carruthers described and named after him *Osmundites Dowkeri*, based upon a fossil stem which Mr. Dowker had obtained from the beach at Herne Bay (see Journ. Bot. 1870, 132). He contributed to this Journal for 1889 (p. 272) a note on *Falcaria Rivini*, which he had observed in the same locality for thirty years, and his help is acknowledged in the *Flora of Kent*.

Alexander Wallace, M.D., who died at Colchester on Oct. 7 at the age of seventy, was born in London, and educated at Winchester and Trinity College, Oxford, where he graduated M.A., and afterwards settled in Colchester as a consulting physician. He was an ardent entomologist, and was associated with a horticultural company which imported lilies and allied plants from Japan, California, etc. He compiled a useful handbook—*Notes on Lilies and their Culture*—which was published in 1873, and in a second edition in 1879; but does not seem to have done any strictly botanical work.

We have also to record the deaths of two veteran British botanists—William Pamplin, who died at Llandderfel, near Bala, on Aug. 9th, in his ninety-third year; and Thomas Bruges Flower, who died at Bath on Oct. 7th at the age of eighty-three. We hope to give some account of them in an early issue, and also of Grant Allen, who died at Hindhead on Oct. 25th.

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BIOGRAPHICAL INDEX

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BY

JAMES BRITTEN, K.S.G., F.L.S., & G. S. BOULGER, F.L.S.

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BRITISH AND FOREIGN.

EDITED BY

JAMES BRITTEN, K.S.G., F.L.S.,

SENIOR ASSISTANT, DEPARTMENT OF BOTANY, BRITISH MUSEUM (NATURAL HISTORY).

CONTENTS.

	PAGE
Notes on *Xyris*. By A. B. RENDLE, M.A., D.Sc. (Plate 403)	497
The Mosses of West Lancashire. By J. A. WHELDON & ALBERT WILSON (concluded)	509
Notes on North Norfolk Plants. By JAMES SAUNDERS	519
Gnaphalium luteo-album in East Anglia. By JAS. BRITTEN, F.L.S.	520
William Pamplin, 1806–1899. By REGINALD W. PHILLIPS	521
SHORT NOTES.—*Potamogeton Drucei* Fryer. — Devon and Somerset *Euphrasiæ*.—*Drosera anglica* in Hampshire	524
Articles in Journals	525
Book-Notes, News, &c.	526

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THE JOURNAL OF BOTANY was established in 1863 by Dr. Seemann. In 1872 the editorship was assumed by the late Dr. Trimen, who, assisted during part of the time by Mr. J. G. Baker and Mr. Spencer Moore, carried it on until the end of 1879, when he left England for Ceylon. Since then it has been in the hands of the present Editor.

Without professing to occupy the vast field of general Botany, the Journal has from its inception filled a position which, even now, is covered by no other periodical. It affords a ready and prompt medium for the publication of new discoveries, and appears regularly and punctually on the 1st of each month. While more especially concerned with systematic botany, observations of every kind are welcomed. Especial prominence has from the first been given to British botany, and it may safely be said that nothing of primary importance bearing upon this subject has remained unnoticed.

Bibliographical matters have also received and continue to receive considerable attention, and the history of many obscure publications has been elucidated. Every number contains reviews of new and important books written by competent critics: in this as in every other respect a strictly independent attitude has been maintained. While in no way officially connected with the Department of Botany of the British Museum, the Journal has from the first been controlled by those whose acquaintance with the National Herbarium has enabled them to utilize its pages for recording facts of interest and importance regarding the priceless botanical collections which the Museum contains. Many important monographs and other works first appeared in its pages. In 1896 it became necessary to increase its size, owing to the number of papers sent for publication: the number of plates was at the same time augmented.

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Species of Xyris

NOTES ON *XYRIS*.

By A. B. Rendle, M.A., D.Sc.

(Plate 403.)

In the course of revision of the material of the genus *Xyris* in the National Herbarium, I have made a few notes which it may be of interest to record, more especially as the possession of the type specimens of some of the earliest described species gives unique advantages to a worker at the British Museum.

I. On the Original Species of Linnæus.

It is well known that Linnæus confused New and Old World plants in the original species (Sp. Pl. 42), and the confusion remains to this day with regard to the American portion. Linnæus' species consists of the following :—

1. *Xyris foliis gladiatis* Gron. Virg. 11. This is no. 219 of Clayton's Virginia plants, and is in the National Herbarium. It is the true *X. torta* J. E. Smith. Linnæus also cites for the same plant "Fl. Zeyl. 35." Unfortunately the specimen referred to is one of the few which are missing from Hermann's herbarium, another of our treasured possessions ; it is therefore quite impossible to decide what species is meant, presumably the plant commonly known as *X. indica* L.

2. *Gladiolo lacustri accedens malabarica, e capitulo botryoideo florifera* Pluk. Alm. 170, t. 416, f. 4. Probably the same as the following.

3. *Katsjiletti-pullu* Rheed. Mal. 9, p. 139, t. 7. Rheede's figure is a good representation of the *X. indica* of authors.

The locality given is "in Indiis." The plant in Linnæus' herbarium is identical with Clayton's Virginian plant, and, as stated by Nilsson in his Revision of the Order (*Studien über die Xylideen*, in K. Sv. Vet.-Akad. Handl. xxiv. no. 14, 39), is the type of *X. torta* Smith. The sheet bears the name *indica* in Linnæus' hand, and also the *K* which indicates that it was an American plant received from Kalm. Sir J. E. Smith has added "*indica* of Pursh? *torta* J. E. S."

This confusion was early recognized. Pursh (Fl. Am. Sept. 33 [1814]), while quoting *X. indica* L. as an American plant, queries the reference to Plukenet's *Almagestum*. In 1818, however, Smith gave a good account of the whole genus in Rees' Cyclop. xxxix. ; he includes twenty-eight species, and, among other things, shows clearly the confusion existing with regard to *X. indica* L. ; he settles the matter by retaining *X. indica* for the East Indian species, and describing as a distinct species, *X. torta*, Kalm's American specimens, which, he says, "appear to answer exactly to the *indica* of Pursh."

In the meantime American botanists had indicated several new species. Those which specially concern us are *X. caroliniana* Walter, Fl. Carol. 69 (1788) ; *X. Jupicai* Michaux, Fl. Bor. Amer.

i. 23 (1803); and *X. flexuosa* Muhl. Cat. Pl. Amer. Sept. 5 (1813). The last named is practically a *nomen nudum*, and the other two are so briefly and inadequately described as to render their identity doubtful. Unfortunately, Walter's species is not contained in his herbarium, now in the British Museum. The identity of all three species therefore remains doubtful. From the first they seem to have been confused by American botanists. Elliott, in his *Botany of South Carolina* (i. 51, 1816), makes *X. caroliniana* Walt. and *X. flexuosa* Muhl. synonymous, as also Barton in Fl. Philadelph. i. 25 (1818), and Darlington, *Flora Cestrica*, 12 (1837). Torrey (Fl. North & Middle Sect. U.S. i. 40 [1824]), cites *X. Jupicai* Mich., *X. flexuosa* Ell., and the *X. foliis gladiatis* Gronov. as synonyms of *X. caroliniana* Walt. Nuttall (Gen. N. Amer. Pl. i. 30 (1818)) has 1. *X. indica;* 2. *X. Caroliniana* (*X. Jupicai*, Michx., *X. flexuosa* Muhl.). Sprengel, Syst. i. 183 (1825), has the same arrangement. Kunth's revision of the genus in 1843 (Enum. Pl. iv.) includes fifty-nine species, among which we find *X. torta* Sm. (p. 14), to which are referred specimens collected by Beyrich in Georgia, and two named *X. caroliniana* in Herb. Willdenow. *X. flexuosa* Muhl. figures with a query as a synonym of *X. caroliniana* Walt. (p. 11), and a new species, *X. bulbosa* (p. 11), is described closely allied to the latter. Gray (Man. Bot. 513 [1848]) keeps up *X. bulbosa* Kunth with *X. Jupicai* in part, *X. indica* Pursh and *X. flexuosa* Muhl. as synonyms, and *X. caroliniana* Walt., of which *X. Jupicai* Mich. in part is a synonym.

In Gray's fifth edition (1868), p. 548, following Chapman (Flora South. U.S. [1860]), *X. flexuosa* Muhl., as the earlier name, replaces *X. bulbosa* Kunth, and *X. torta* Sm. is included for the same plant as that recognized by Kunth, which is characterized by having the lateral sepals exceeding the bracts, and conspicuously fringed above the middle of the keel. The distinctions between the three species, which are clearly indicated by Gray, have been retained in later American floras, with the names adopted by him: *X. flexuosa* Muhl., with lateral sepals finely ciliate on the narrow wingless keel, and having a small apical tuft; *X. caroliniana*, with lateral sepals obscurely lacerate-fringed above on the winged keel; and *X. torta*, with the character above indicated; see, for instance, Ries "Review of the N. American Species of the Genus *Xyris*" in Bull. Torr. Bot. Club, xix. 35 (1892),* and Britton & Brown, in their recent *Illustrated Flora of the Northern States* (pp. 369, 370), where the descriptions are accompanied with good figures. Nilsson also has the same arrangement, which is obviously the expression of a gradual consensus of opinion, rather than the result of an examination of the original specimens, which nobody seems to have seen. Of one thing, however, there can be no doubt—namely, *X. torta*

* It seems desirable to enter a protest against the wholesale citation of unpublished names as synonyms; associated with the fourteen species which are retained, no fewer than ten MS. names are here quoted, mostly from Chapman's herbarium. Such citations are absolutely useless, and seriously encumber an already overburdened synonymy.

Smith, the excellent type specimens of which are in Linnæus' herbarium in the Linnean Society's rooms in London. It is not the *X. torta* of American authors, but the plant referred by Gray and later American authors to *X. flexuosa* Muhl. and represented by Britton & Brown's fig. 893, and is identical with Clayton's Virginian plant cited by Gronovius, and apparently with Banister's Virginian plant cited by Plukenet (Almag. 170)—*Gladiolus luteus tripetalos, floribus plurimis minimis, ex uno capitulo squamoso erumpentibus.* Whether, in view of the uncertainty as to the identity of Muhlenberg's plant, his name, which is five years earlier than *X. torta*, can be set aside, may be matter for discussion; in any case, Smith's name cannot be dissociated from the plant in question. The very well-marked species generally known as *X. torta* Sm. is said by Ries (*l. c.* p. 41) to be synonymous with a Cuban species, *X. conocephala* Sauv. Fl. Cub. 159 (1868). I have not seen the latter plant, but find nothing antagonistic in the description; it has, moreover, the white petals so characteristic of the mainland species, as pointed out by Nash (Bull. Torr. Club, xxii. 159), and indicated also by Rugel on the ticket with a Florida specimen. The following gives the synonymy of the two species:—

1. X. FLEXUOSA Muhl. Cat. Pl. Am. Sept. 5 (1813), nomen semi-nudum; Gray, Man. Bot. 513 (1848), sub *X. bulbosa;* Chapm. Fl. South. U.S. 500 (1860); Gray, Man. Bot. ed. 5, 548 (1868); Ries in Bull. Torr. Club, xix. 37 (1892); Britton & Brown, Ill. Fl. North. U.S. &c. i. 369, fig. 893 (1896), &c.

? *X. Jupicai* Mich. Fl. Bor. Am. i. 23 (1803).

X. foliis gladiatis Gron. Virg. 11 (1743).

X. indica L. Sp. Pl. 42 (1753), in part; Pursh, Fl. Am. Sept. 33 (1814); Nutt. Gen. i. 30 (1818).

X. torta Sm. in Rees' Cyclop. xxxix. no. 11 (1818).

X. bulbosa Kunth, Enum. iv. 11 (1843); Gray, Man. Bot. 513 (1848).

2. X. CONOCEPHALA Sauv. Fl. Cub. 159 (1868).

X. torta Kunth, Enum. iv. 14, and Auct., non Sm.

We have in the Department of Botany what is probably the earliest specimen extant of this species, in the herbarium of Carolina plants made by William Young in 1767.*

II. NOTES ON AUSTRALIAN SPECIES.

The majority of the types of the species endemic to Australia are to be found among Robert Brown's plants, the value of which does not always seem to have been exhausted in the account of the order in the *Flora Australiensis*. As Nilsson, moreover, apparently worked with a very limited Australian collection, and largely quotes Bentham for his disposition of Brown's species, it may be well to record somewhat in detail the results of an examination of the material in the National Herbarium and at Kew. I have cited under each species only specimens which I have seen.

* See Journ. Bot. 1894, 332–7.

1. X. COMPLANATA R. Br. Prodr. 256 (1810); Benth. Fl. Austral. vii. 77 (1878), including var. ? *leptocaulis* Benth.

X. lævis R. Br. *l. c.*

X. scabra R. Br. *l. c.*

X. elongata Rudge in Trans. Linn. Soc. x. 289, t. 15, fig. 1 (1811).

North Australia.—Carpentaria, *Brown*, no. 5732 (*X. complanata* R. Br.!), no. 5729 (*X. lævis* R. Br.!), no. 5730 (*X. scabra* R. Br.!); Port Essington, *Armstrong;* Port Darwin, *Schomburgk;* Kunckey's Lagoon, Adelaide River, and Palmerston, *Lea;* Cape York, *MacGillivray*, *Hann* no. 94; Bathurst Island, *Cunningham*, nos. 6, 7, 300.

Queensland.—Endeavour River and Point Look-out, *Banks & Solander;* Endeavour River, *Mueller;* Port Curtis, *MacGillivray;* Rockingham Bay, *Dallachy;* Moreton Bay, *Stuart;* between Fitzmaurice and Victoria river, near Brisbane river, and mouth of Victoria river, &c., *Mueller.*

New South Wales.—Port Jackson, *Brown*, no. 5731, *Fleming* (*X. elongata* Rudge!), *Caley*, *Cunningham*, *Woolls;* Mount Mitchell, *Beckler.*

I have not seen var. *bracteata* Benth. from Moreton Bay.

2. X. PAUCIFLORA Willd. Phytogr. i. 2, t. 1 (1794); Benth. *l. c.* 77, excl. synon. *X. paludosa* Br.

X. pusilla R. Br. & *X. denticulata* R. Br. Prodr. 256.

North Australia.—Around lagoon near Mt. McAdam range, *Mueller.*

Queensland.—Endeavour River, *Banks & Solander* (including *X. denticulata* R. Br.! *X. pusilla* R. Br.!), *Cunningham*, nos. 8, 9, 356.

X. denticulata Br. and *X. pusilla* Br. seem inseparable from *X. pauciflora*. *X. pusilla* was a MS. species of Solander's; there is a figure by James Miller in the series of Cook's drawings; it is a form with short broad ensiform leaves.

It may be worth pointing out that "*v. v.*" appended to Brown's diagnosis of *X. pusilla* (Prodr. 256) should read "B. *v. s.*" It appears both from the herbarium and his MS. that Brown did not collect the plant; his diagnosis is drawn up entirely from those gathered by Banks and Solander.

3. X. PALUDOSA R. Br. Prodr. 256.

This species is included by Bentham in *X. pauciflora* Willd. along with *X. denticulata* and *X. pusilla*, all of which, together with specimens assigned by Brown to *X. pauciflora*, were collected by Banks and Solander at Endeavour River. Bentham says the four species enumerated by Brown "appear to me to differ only in size and luxuriance: the two smallest slender forms, 2–3 in. high, with very small heads (*X. paludosa* and *pusilla*), gathered in the same locality by Cunningham, represent well Willdenow's figure." The reference to *X. paludosa* is misleading, as the specimens range from 5 to 15 in. high, and the heads reach 4 lines in diameter. The species is also characterized by its long limp linear-tapering leaves, and is distinguished from *X. pauciflora* by its more rounded bract-scales, very narrow lateral sepals, and large black narrowly ellip-

soidal seeds half as large again as the brown or red-brown seeds of *X. pauciflora*.

The plant was collected in 1770 on Cook's first voyage, and a drawing by James Miller is one of the fine series preserved in the Department of Botany; it was, however, not engraved. It may be of interest to append Solander's MS. description:—

Xyris paludosa. "Habitat in paludibus, fossisque aquosis. *Folia* pauca, dimidio caule longiora, subfistulosa, rubicunda, basi vaginantia. *Vagina* convoluta spatio sæpe quadriunciali, scapum arcte includens. *Scapus* pedalis vel raro sesquipedalis, inferne rubicundus, teretiusculus, fistulosus, superne e triquetro parum compressus. *Spica* subrotundo-ovata, obtuse pentagona, tres vel quatuor lineas longa. *Squamæ* gibbosiores quam in [the species subsequently described as *X. scabra* R. Br.] magisque brunneæ et nitentes."

Queensland.—Endeavour River, *Banks & Solander*.

4. X. FLEXIFOLIA R. Br. Prodr. 256; Benth. *l. c.* 78.

There is some confusion between this species and *X. gracillima* Muell. *X. flexifolia* is a small plant 6–14 in. high, with filiform twisted leaves 3–6 in. long, and short deep reddish-brown sheaths 1–2 in. in length; the largest heads barely reach 3 lines in length. Bentham describes the stems as "usually 1 ft. high or rather more, with a single long brown sheath at the base," and "flower-head oblong or narrow-ovoid, 3–4 lines long"; terms incorrect for *X. flexifolia*, but suiting *X. gracillima*. Other points of discrimination duly noted by Bentham are the jagged black margins of the scales, narrow petal-limbs, and absence of staminodes in *X. flexifolia;* and the entire black margin of the scales, broader petal-limbs, and staminodes ending in a glabrous dilatation in *X. gracillima*.

West Australia.—Princess Royal Harbour, King George's Sound, *Brown*, no. 5723; Swan River, *Drummond*, no. 254 in part.

5. X. GRACILLIMA Muell. Fragm. viii. 203 (1874); Benth. *l. c.* 80.
West Australia.—*Drummond*, no. 119, no. 354 in part.

6. X. GRACILIS R. Br. Prodr. 256; Benth. *l. c.* 79, in part.
New South Wales.—Between Sydney and Paramatta, *Brown*, no. 5725; *Caley;* Cox's River, *Cunningham*, no. 207; *Sieber*, no. 427; Hastings River, *Beckler;* New England, *Stuart*.

Victoria.—Port Philip, marshy heaths at the foot of Arthur's Seat, *Brown*, no. 5724; Gippsland, *Walter*.

Var. *bracteata* Benth. *l. c.* Bracts as in the species, but slightly broader, the outer sometimes enlarged and spreading; heads subglobose, and lateral sepals very broad, 6 mm. long by 1·6–1·7 mm. broad, the breadth in the type not exceeding 1 mm.

We have an interesting specimen from Port Jackson, "sent to Sir J. Banks without radical leaves," which puzzled Robert Brown, who gave it a "dubious" specific name in MS. It is perhaps a distinct species.

New South Wales.—Port Jackson.

Tasmania.—South Port, *Stuart;* Circular Head, *Mueller*.

7. X. JUNCEA R. Br. Prodr. 256.

This species, placed by Bentham under *X. gracilis* (*l.c.* 79), is, I think, quite distinct. The habit is by no means "*gracilis*," the plants being of a shorter sturdy growth, 15–25 cm. in height, or less than half that of *X. gracilis*, with leaves of only 5–10 cm. length. The spikes are broader and rounder, with concolorous chestnut-brown bracts carinulate above the middle. The lateral sepals are also shorter, with a well-marked scabridulous keel.

New South Wales.—Port Jackson, *Brown*, no. 5726.

Var. *tenuior* R. Br. MS. Leaves and peduncles slenderer than in the type, the former 3–20 cm. long, ·25–·7 mm. broad, the latter 7·5–35 cm. long by ·5 mm. or less in diameter; spikes smaller, but otherwise similar, 3–5 mm. long and broad.

New South Wales.—Port Jackson, *Brown*, no. 5728. In swamps between Sydney and Botany Bay, *Caley*, Jan. 1804.

8. X. OPERCULATA Labill. Nov. Holl. i. 14, t. 10 (1804); Brown, Prodr. 257; Benth. *l. c.* 79. (Pl. 403, figs. 29, 34.)

X. Brownei Kunth, Enum. iv. 22; Nilss. in K. Sv. Vet. Akad. Handl. xxiv. no. 14, 26.

Brown assigns to this species specimens collected at Port Dalrymple in Tasmania, and Port Jackson in New South Wales. They differ from the type of Labillardiere from Tasmania, which we have at the British Museum, in their more robust character, but especially in the much larger flower-heads, and the strikingly regular five-rowed arrangement of the bracts. Thus the spikes in Labillardiere's type are ellipsoid-lanceolate, 8 by 3 mm., and comprise three rows of barren scales followed by three perfect flowers; those in Brown's plant are broadly ellipsoid from a turbinate base, may have as many as seven rows of barren scales, increasing very regularly in size upwards, followed by nine perfect flowers, and measure 10 by 7·5 mm. The marked quinquefarious regularity of the imbrication suggested a specific novelty to Brown, with a characteristic name; but he subsequently, both in his MS. notes and on the ticket placed with the specimens, assigned the plants to *X. operculata*. Smith, in his account of his genus (Rees' Cyclop. no. 27), remarks on "the remarkable character of the five-ranked scales of the head, and the numerous, gradually diminishing ones, destitute of flowers, at its base; so that, but for Mr. Brown's authority, we should have supposed our Port Jackson plant to be essentially and widely different." Kunth, however (*l. c.*), separated the Port Jackson plant under the name *X. Brownei*, in which he is followed by Nilsson in his recent revision of the genus. Bentham, on the contrary, only recognizes a single species, but omits any citation of *X. Brownei* as a synonym. Nilsson has not seen the type-specimens, a comparison of which, with the help of collections by Caley, Cunningham, and others, show that we are dealing with one species only, the spikes of which vary considerably in shape, size, and greater or less regularity of the five rows of bracts. The specimens, that is to say, bear out Brown's view. Kunth, in his diagnoses, contrasts the leaves of his two species, those of *X. Brownei* being "filiformibus," those of *X. operculata* "angustissime ensi-

formi-linearibus." I find no such difference in the types, the leaves of Labillardiere's specimen showing a nearer approach to filiform than those of Brown.

New South Wales.—Port Jackson, *Brown*, no. 5720 in part; *Tench*, *Lhotsky*; Botany Bay, *Lowne*; Hastings River, *Beckler*; New England, *Moore*.

Victoria.—Mt. Abrupt, *Wilhelmi*; Mt. Eversley, *Robertson*; Recherche Bay, *Cunningham*; Caulfield, *French*; Dandenong, *Mueller*.

Tasmania.—*Labillardiere*! *Nelson*; Port Dalrymple, *Brown*, no. 5720 in part; Adventure Bay, *Caley*; *Cunningham*, no. 11; *Gunn*, no. 334; Flinders Island.

9. X. BRACTEATA R. Br. Prodr. 256; Kunth, Enum. iv. 21. (Pl. 403, fig. 33.)

X. operculata Labill. var. *bracteata* Benth. Fl. Austral. vii. 80. I cannot agree with the subordination of this species to the varietal position suggested by Bentham; it seems to me quite distinct, characterised not only by the enlargement of the lower bracts and their lighter colour, but especially by the flat comparatively broad (to nearly 4 mm.) linear leaves, the longer sepals with glabrous not hairy blunt tips, and the larger anthers, which are moreover deeply lobed at the apex, and twice as long as their filament.

Nilsson, who did not see the specimens, merely doubts as to which of the two species, *X. opercutata* or *X. Brownei*, Bentham's var. *bracteata* should be assigned.

New South Wales.—Port Jackson, *Brown*, no. 5727.

10. X. marginata, sp. nov. (Pl. 403, figs. 25–28, 30–32).

Planta cum habitu *X. operculatæ* Lam. sed spicis ellipsoideis vel subglobosis sublaxis, et bracteis supra medium in margine lata crispa fragili nigrescente expansis; sepalis lateralibus subfalcate-oblongis, punctulatis, dorso anguste carinatis, marginibus latis fimbriatulis; corollæ limbis orbicularibus; antheris late ellipsoideis parvis quam filamenta triplo brevioribus; staminodiis in pilis densis moniliformibus desinentibus; ovario pyriformi.

Leaves narrowly linear acute, 9–12 cm. long, a little over 1 mm. broad, passing below into the scarious-margined chestnut-brown sheaths, 3 cm. long. Peduncles terete flexuose, 15·5–35 cm. long, 1 mm. or less in diameter; sheaths leafless, acute, 4·5–6 cm. long; spikes 9–11 mm. long by 6–7 mm. broad; outermost sterile bracts oblong, 4–5 by 2 mm., passing into the form of the fertile bracts, which have an ovate or ovate-elliptical inconspicuously many-nerved concave central area, and a darker scarious margin, which above the middle forms a very broad emarginate brittle wing. Lateral sepals about 5·5 mm. long by 1·5 broad, the keel scabridulous, and the broad margin ragged throughout, especially towards the apex. Petal limbs 5 mm. long and as broad; anther ·7 mm. long, filament 2 mm., the densely hairy staminodes reaching to the base of the anthers; ovary 3–3·5 mm. long, with an enlarged rounded apex and terminal mucro.

Near *X. operculata* Labill., which it closely resembles in habit, but is at once distinguished by its laxer flower-heads, and the dark

broad crisp upper margin of the bracts; the sepals are also characteristic, being broader, with the margin ragged throughout its length, not merely ciliolate at and below the apex as in *X. operculata*. The larger laxer heads and broad fimbriate lateral sepals separate it from the closely allied *X. gracilis* R. Br.

Tasmania.—In peat soil, *Milligan*.

11. X. LANATA R. Br. Prodr. 257; Benth. *l. c.* 80.

West Australia.—King George's Sound, *Brown*, no. 5719, *Cunningham*, *Fraser*, *Collie*, *Wakefield*, *Mueller*, *Grey;* Swan River, *Drummond*, no. 354 in part; Champion Bay, *Bower*.

12. X. LAXIFLORA Muell. Fragm. viii. 203 (1874); Benth. *l. c.* 80.

West Australia.—Swan River, *Drummond*, nos. 202, 355; Vasse and Augusta Road, *Gilbert*.

13. X. LACERA R. Br. Prodr. 257; Benth. *l. c.* 78.

West Australia.—King George's Sound, *Brown*, no. 5721, *Baxter;* Swan River, *Drummond*, nos. 200, 201, 329, and 354 in part; Augusta, *Gilbert;* Wilson's Inlet, *Oldfield*, no. 741.

Var. *teretifolia*.

X. teretifolia R. Br. Prodr. 257. Distinguished from the species by the highly scabrid leaves and peduncles, and the very stiff terete leaves and smaller spikes. Brown says in his MS.: "Proxime accedit *Xyridi laceræ* differt culmo foliisque scabris, capitulo minore ovato."

West Australia.—Sandhills near the shore at Lucky Bay.

14. X. USTULATA Nilss. in Kon. Sv. Vet.-Akad. Handl. xxiv. no. 14, 28 (1892). This species, which is nearly allied to the West Australian *X. lacera*, is described merely with the general locality "Australia (in herb. Holm.)." We have at the British Museum two collections which must, I think, judging from Nilsson's descriptions, be referred to his species. Both are from New South Wales. One labelled *X. bracteata* R. Br., but quite a distinct plant, was collected by Allan Cunningham on the voyage of the "Mermaid"; the other by George Caley in a "marshy plain, Mount Banks, Nov. 1804." In Caley's *Journals of Tours in New South Wales, and Descriptions of Plants Collected*, preserved in MS. in the Department of Botany, there is a long account of his trip, in which I find the following note:—"*Xyris*. Petals very large, serrated. Either a distinct species or else it is very luxuriant. Grows in marshy situations on the side of Mount Banks. Nov. 1804."

This seems to be the *X. operculata* var. *macrocephala* Benth. (Fl. Austral. vii. 80) from the Blue Mountains. Specimens collected in that district by Cunningham and Woolls in herb. Kew. are evidently conspecific with the above. It is, I think, quite distinct from *X. operculata;* its large robust-looking heads attaining 1·8 cm. in length and breadth, with a globose or broadly ovate form; its broad bracts have moreover a characteristic dark crisped margin, while the lateral sepals are not dorsally ciliate. It is distinguished from *X. lacera*, next to which Nilsson places it, by its larger darker heads, bracts with crisped not lacerate margins, and the presence of filiform staminodes.

There is seen to be a sharp geographical separation between the species which form eastern and western groups. All are endemic except the two common Indo-Malayan species, *X. complanata* (= *X. Walkeri* Wight) and *X. pauciflora*, the latter of which has apparently reached only the north of the continent, while the range of the former extends southward into New South Wales.

Eastern Species 9 (Including Tasmania)		Western Species 5
X. complanata	Indo-Malayan	*X. flexifolia*
X. pauciflora		*X. gracillima*
X. paludosa		*X. lanata*
X. gracilis		*X. laxiflora*
X. juncea		*X. lacera*
X. operculata		
X. bracteata		
X. marginata		
X. ustulata		

III. Various New Species.

I append descriptions of several new species from various parts of the world. Those of most interest are the two from New Caledonia, from which the genus does not seem hitherto to have been recorded. The types will be found in the National Herbarium.

X. Ridleyi, sp. nov. (Pl. 403, figs. 12–16.) Planta cæspitosa glabra gracilis foliis anguste linearibus pungentibus vix rigidulis quam pedunculi elongati teretes graciles triplo brevioribus; spicis inter minores hebeti-brunneis ovoideis ad obovoideis multifloris; bracteis, paucis infimis minoribus exceptis, fertilibus aperte et late scaphoideis 6–10-nerviis, sub apice rotundo vix ciliolato obtuse carinatis; sepalis lateralibus bracteas æquantibus lineari-subfalcatis cum carina angusta haud alata scabridula; corolla . . .; staminibus . . . fructu oblongo uniloculare cum placentis tribus prominentibus.

Leaves not exceeding 1·25 mm. in breadth, 12–20 cm. long, including the short broader scarcely keeled sheath (about 2·5 cm. long). Several peduncles spring from a single leaf-tuft; sheaths to 8 cm. long, with a short (to 1 cm.) free apical portion; peduncles to 45 cm. long, ·5–·7 mm. thick; spikes 7–9 mm. and slightly narrower; of a dull chestnut-brown colour, the outermost barren pair flat elliptical, emarginate, 3 mm. long, the second (also barren) broader obovate subconcave, 4 mm. long; fertile bracts roundly ellipsoid in outline but of a broadly open boat-shape, the nerves anastomosing above and converging to the keel, which occupies the upper third or less of the dorsal surface, about ·5 cm. long; sepals paler except along the narrow keel, the larger side 1 mm. broad; ovary, 2 mm. long; seed ellipsoidal.

Near *X. pauciflora* Willd., but distinguished by the elongated very slender terete peduncles, concolorous bracts and the narrow unwinged keels of the sepals.

Hab. Kedah Peak, Malay Peninsula. June, 1893, *Ridley*, no. 5150.

X. borneensis, sp. nov. (Pl. 403, figs. 7–11.) Planta cæspitosa rigidula foliis erectis tenuibus spiraliter tortis acutis, pedunculis numerosis gracilibus teretibus striolatis flexuose tortulis folia excedentibus; spicis parvis ellipsoideis paucifloris fusco-brunneis; bracteis sterilibus ellipticis margine vix pallidiore superne erosulosa, sub apice dorso breviter carinata, area centrali inconspicue plurinervia; bracteis fertilibus concavis quam steriles majoribus sed iis similibus; sepalis lateralibus lineari-subfalcatis cum carina angusta scabridula et marginibus angustis pallidioribus.

Plants forming dense tufts of slender wiry leaves and peduncles, the former reaching 20 cm. in height, 1–1·2 mm. or less in breadth; peduncles 20–40 cm. high, ·6–1 mm. in diameter; spikes a dirty brown, 5–6 mm. long by 3–4 mm. broad; barren bracts 3·5–4·5 mm. long by 1·5–2 mm. broad; the fertile reaching 5 by 3 mm.; the central more rigid area slightly darker and with numerous parallel nerves which converge and anastomose above; lateral sepals 4·5 mm. long by ·6–·7 mm. greatest breadth. The petal-limbs in an unopened bud were obovate-elliptical; the anthers broadly oblong, and the two-armed staminodes pilose. Ovary unilocular with three slightly projecting placentas.

The species approaches the last (*X. Ridleyi*) in its narrow scabridulousy keeled sepals and its small dull brown heads. It differs, however, in the wiry twisted habit of stem and leaf, and also in the more shallowly concave form of the fertile bracts, which are only slightly keeled below the lip.

Hab. North Borneo, *Burbidge*, 1877–78. There are also specimens in herb. Kew. labelled Borneo, *Barber*.

X. Lobbii, sp. nov. (Pl. 403, figs. 17–24.) Planta insignis glabra foliis elongatis lineari-ensiformibus e vagina angustiore rubescente subacutis, ad medium pedunculi solitarii fistulosi subcompressi subrobusti estriati attingentibus vel eum excedentibus; spicis globosis multifloris, bractearum margine fragili læte brunnea, area centrali subfusca basi rubescente, bracteis sterilibus rotundate-ovoideis ad subobovoideis, fertilibus majoribus spathulate-obovoideis; sepalis lateralibus falcatis marginibus pallidis nitentibus dorso cum carina cristiforme læte brunneo; corollæ limbis luteis rotunde-ellipticis; antheris sagittatis; staminodiorum brachia dua superne in pilos desinentia; ovario oblongo, stigmatibus tribus apice dilatatis.

Leaves, including sheath, 25–40 cm. long, 4–6 mm. broad; peduncles 65 cm. long, nearly 3 mm. in diameter below, tapering slightly above; spikes 10–12 mm. long and broad; barren bracts 5–6 mm. long by 3·5–4 mm. broad; largest fertile bracts, 8 by 5 mm.; lateral sepals 6·5–7 mm. long, reaching 2 mm. in breadth above the middle; petal-limb (in bud), 6 by 5 mm.; anthers 4 mm. long; filament 1·5 mm.; staminodes slightly shorter than the stamens.

Recalls *X. indica* L. in habit, but is readily distinguished by its terete non-striate peduncles, and lighter and strikingly particoloured heads.

Hab. Java, *Lobb*, no. 362.

X. neocaledonica, sp. nov. (Pl. 403, figs. 35–41.) Dense cæspitosa elata robusta foliis . . . ; pedunculis validis late compressis, vagina rigida compressa cum apice brevi obtuso; spicis magnis globosis vel ellipsoideis fusco-brunneis lucidis multifloris; bracteis sterilibus in pluribus seriebus imbricatis ovatis 5-nerviis concoloribus; bracteis fertilibus late ellipticis superne demum late oblongis 7–9-nerviis cum margine imbricata pallidiore; sepalis lateralibus subfalcatis supra basin latioribus cum carina valida ciliolata; petalorum ungue purpureo, limbo luteo latissime ovato; antheris oblongis filamenta angusta duplo excedentibus; staminodiorum brachiis geminis inæqualiter trilobatis dense aureo-pilosis; stylis apice rhombeo-dilatatis; ovario triloculari.

Peduncles 80–100 cm. long, 4–5 mm. broad; sheath 24 cm., with a strongly striate deep reddish-brown base; spikes 17–26 mm. long by 15–20 mm. broad; sterile bracts, increasing in size from below upwards, 4–8 mm. long, the largest reaching 6 mm. broad, nerves anastomosing above; fertile bracts 11–15 mm. long by 9 to 10 mm. broad, nerves similarly anastomosing; sepals 9–13 mm. long by 1·75–2·5 mm. broad, apex more or less prominently notched; claw of petals 1 cm. long; limb (from unopened bud) 8 by 7 mm.; anther 3 mm. long; filament 1·5 mm.; staminodes falling a little short of the anthers. Unripe fruit incompletely trilocular at the apex.

This, the first *Xyris* recorded from New Caledonia, approaches the widespread tropical Asiatic *X. indica*, but is a more robust plant with larger bracts and flowers, differing also in the colour of the heads, which are of a dark polished brown.

Hab. New Caledonia. Dry ferruginous soil, 400 metres; *Pancher*, no. 411. Mt. Mon; *Vieillard*, no. 1408, in herb. Hance, no. 17,369.

X. Pancheri, sp. nov. Dense cæspitosa foliis scabridulis e vaginis scariosis rubro-brunneis elongatis anguste linearibus tortulis; pedunculis subteretibus scabridulis; spicis e basi turbinata ellipticis vel globoso-ellipticis læte brunneis circa 5-floris; bracteis quinquefariis cum area centrali lanceolata ad ovata plus minus pallidiore et margine subfragili supra basin ampliata, sterilibus infimis parvis ovatis, ceteris ad bracteas fertiles ellipticas transitum præbentibus; sepalis lateralibus falcato-lanceolatis cum carina ciliata et margine sublata integra; antheris bilobatis filamenta vix excedentibus; staminodiis superne ampliatis margine dense sed brevius pilosis; ovario basi tantum triloculari.

Leaves, including sheath (6–8 cm.), reaching 40 cm. in length by 1–2 mm. broad; sheaths of peduncles becoming loose and membranous above, with a short pungent awn-like apex, $\frac{1}{4}$–$\frac{1}{5}$ the length of the scape, the longest of which is 75 cm. with a diameter of 2 mm. in the lower part; spikes 15–18 mm. long by 10–12 mm. broad; lowest sterile bracts about 3 mm. long by less than 2 mm. broad, increasing rapidly in size after the first three rows, and passing into the large shallowly concave blunt bracts; flowers yellow; lateral sepals 9 mm. long by little over 2 mm. broad; anthers

lanceolate-oblong, bilobed for about two-fifths the length from the apex, shortly bilobed at the base; staminode spreading at the apex into a broad truncate disc, with densely hairy margins, about 1·5 mm. broad, much shorter than the stamens.

Distinguished from the last by its less robust habit, subterete peduncle, and paler parti-coloured smaller heads.

Hab. New Caledonia. Damp hollows on dry ferruginous mountains at a height of 150 m.; *Pancher*, no. 412.

X. ERUBESCENS Rendle in Welw. Cat. ii. 73 (1899). Dr. Rand has recently collected this species in Rhodesia. His specimens comprise three peduncles to the base of one of which is attached a leaf. The spikes are also in flower. As the type-specimens from Huilla have no leaves or open flowers, the following notes will supplement the description in the *Catalogue*.

Leaf narrowly terete subpungent, passing into a narrow chestnut-brown glabrous sheath, 18 cm. long including the sheath; blade ·7 mm. broad; peduncles (longer than in Huilla specimen) 35 cm. long; spikes 8 mm. long and nearly as broad; corolla yellow; petals orbicular-obovate ·5 cm. long and as broad; anthers oblong, 2 mm. long; the broad filament 1 mm. long; styles filiform not dilated, 3 mm. long.

X. Thompsoni, sp. nov. (Pl. 403, figs. 1–6.) Gracilis foliis planis anguste linearibus flaccidis erectis quam pedunculus tenuis elongatus compressus anguste marginatus duplo minoribus; spicis depresso-globosis, læte brunneis, pauci- (5-) floris; bracteis sterilibus ellipsoideis scariosis cum parte centrali triangulari trinervio indurato, apice retuso; bracteis fertilibus majoribus obovatis 5-nerviis cum margine scarioso superne latiore; sepalis lateralibus pallide stramineis angustis supra medium latioribus, carina angusta glabra; corolla . . .; staminibus . . .; capsulæ valvis tribus late ellipsoideis, seminibus rubris ellipsoideis cum lineis longitudinalibus striatis.

The specimens bear no perfect leaves—the largest reaches 13·5 cm. by 2 mm. in breadth—they pass gradually below into narrow brown sheaths; sheaths of peduncles blunt, reaching 8 cm. in length; peduncles to 34 cm. long; spikes ·5 cm. long by 6–7 mm. broad; sterile bracts 2·7–3 mm. long by 2 mm. broad; fertile larger than the sterile, with a large ovate median harder portion becoming much indurated at the apex, and a narrower scarious margin, the largest 4 by 3·5 mm.; lateral sepals 4 mm. long, ·5 mm. broad at the base, becoming ·7 mm. above in the natural plicate state; capsule valves 3–3·5 mm. long; flowers absent.

Near the Madagascar species *X. humilis* Kunth, which it resembles in the character of its spikes, but is a much taller plant, three to four times the height, and differing in its elongated linear leaves and smaller obviously keeled sepals.

Hab. Madagascar; *J. V. Thompson*.

Explanation of Plate 403.

Figs. 1–6. *X. Thompsoni* Rendle:—1. Portion of leaf, nat. size. 2. Spike, nat. size. 3. Barren bract, dorsal view, × 3. 4. Fertile bract, dorsal view, × 3. 5. Lateral sepal, side view, × 3. 6. Valve of capsule, viewed from inside showing raised placenta bearing funicles, × 3. Figs. 7–11. *X. borneensis* Rendle:—7. Lateral sepal, side view, × 3. 8. Spike, nat. size. 9. Barren bract, dorsal view, × 3. 10. Fertile bract, dorsal view, × 3. 11. Upper half of leaf, nat. size. Figs. 12–16. *X. Ridleyi* Rendle:—12. Spike, nat. size. 13. Fertile bract, dorsal view, × 3. 14. Lateral sepal, side view, × 3. 15. Seed, × 40. 16. Upper half of leaf, nat. size. Figs. 17–24. *X. Lobbii* Rendle:—17. Upper half of leaf, nat. size. 18. Spike, nat. size. 19. Barren bract, dorsal view, × 3. 20. Fertile bract, dorsal view, × 3. 21. Lateral sepal, side view, × 3. 22. Petal-limb with stamen, × 3. 23. Staminode, × 3. 24. Pistil, × 3 (taken from a bud). Figs. 25–28. *X. marginata* Rendle:—25. Spike, nat. size. 26. Barren bract, dorsal view, × 3. 27. Fertile bract, dorsal view, × 3. 28. Lateral sepal, side view, × 3. Fig. 29. *X. operculata* Labill., side view of lateral sepal, × 3. Figs. 30–32. *X. marginata* Rendle:—30. Petal-limb with stamen, × 3. 31. Pistil, × 4. 32. Upper half of leaf, nat. size. Fig. 33. *X. bracteata* R. Br., stamen. Fig. 34. *X. operculata* Labill., stamen. Figs. 35–41. *X. neocaledonica* Rendle:—35. Spike, nat. size. 36. Barren bract, dorsal view, × 3. 37. Fertile bract, dorsal view, × 3. 38. Lateral sepal, side view, × 3. 39. Petal with stamen, × 3 (taken from a bud). 40. Staminode, × 3 (taken from a bud). 41. Pistil, × 3 (taken from a bud).

THE MOSSES OF WEST LANCASHIRE.

By J. A. Wheldon and Albert Wilson.

(Concluded from p. 473.)

Ulota Bruchii Hornsch. Very rare. 1. On ash tree in a pot-hole on Leck Fell, July, 1898, *Wi.* On trees in Easegill.

Orthotrichum rupestre Schleich. Rare. 1. Near Silverdale, June, 1898, *Wh.* Easegill, near Leck, *Wi.* — *O. anomalum* Hedw. var. *saxatile* Milde. Abundant everywhere on the limestone of North. First record, Silverdale, April, 1898, *Wi.* 2. Chipping, Leagram, and Whitewell, *Wh.* — *O. cupulatum* Hoff. Much less common than the last-named. 1. Silverdale, April, 1898, and Over Kellet, *Wi.* Easegill and Dalton Crag. 2. Stonyhurst and Chipping, *Wh.* — [Var. *nudum* Braith. 2. Banks of the Hodder, *Wood* (Br. Moss Flora). I have sought for this, hitherto in vain, on the Lancashire bank of the Hodder. It is doubtful which county Dr. Woods' locality should be placed in, *Wh.*] —*O. Lyellii* H. & T. Rare, or perhaps overlooked. 1. On trees near Burton, June, 1899. —*O. affine* Schrad. Apparently rare. 2. Between Caton and Lancaster, Aug. 1898, and on oaks between Crumpax and Chipping, *Wh.* Udale. — Var. *rivale* Wils. Tree roots by the Hodder near Mitton, *Wh.* — *O. rivulare* Turn. Not common. 2. Artle Beck, Caton, Aug. 1897, *H.* Crook of Lune and near Mitton, *Wh.* Above Redscar, Preston, *Wh.* — *O. stramineum* Hornsch. 1. Over Kellet, June, 1899, *Wi.* 2. Near Cockleach, *Wh.*—*O. diaphanum* Schrad. Frequent on elder and hawthorn, &c. 2. Near Lower Hodder Bridge, May, 1898, between Stonyhurst and Longridge, and on

stones near Chipping Mill, *Wh.* Udale. 1. Over Kellet, *Wi.* Yealand, Bare, and Heysham *Wh.* Dalton Crag. 3. Plentiful on hawthorns near Fleetwood.

Tetraplodon mnioides B. & S. Very rare, and perhaps already exterminated by "improvements." 3. Cockerham Moss, 1881, *Wi.*

Ephemerum serratum Hpe. Infrequent. 3. Lytham, Nov. 1881, *Wh.*

Funaria hygrometrica Sibth. Abundant and generally distributed. — Var. *calvescens* B. & S. Bispham, July, 1898, *Wh.* — *F. calcarea* Wahl. Frequent in the limestone district of North. 1. Silverdale, April, 1898, *Wi.* Trowbarrow, Thrang End, Yealand, and near Haweswater, *Wh.*

Amblyodon dealbatus P. B. Rare. 2. West side of Clougha, 1881, *S.* 3. Between Lytham and St. Annes, fruiting, *Wh.*

Meesea trichoides Spr. 3. With the last near St. Annes, barren, *Wh.*

Aulacomnion palustre Schwgr. Frequent in boggy places, but rarely fruiting. 1. Storrs Moss, April, 1898, and Borwick (with fruit), *Wi.* 2. Longridge Fell, *Wh.* Lower Bleasdale and Grizedale near Garstang (fruit), and Hindburn, *Wi.* Clougha and Udale.

Bartramia Œderi Sw. Rare. 1. Easegill, Leck, in plenty, with fruit, July, 1898, *Wi.*—*B. ithyphylla*, Brid. Rare. 1. Easegill, descending lower than the preceding species, July, 1898, *Wi.* Greygarth Fell, with fruit in both localities. *B. pomiformis* Hedw. Frequent, and usually fruiting. 2. Sandholme, Garstang, May, 1898, *Wi.* Udale. 1. Skerton, *Wh.* Easegill. 3. Near Pilling, *Wi.*

Philonotis fontana Brid. Frequent in wet places amongst the hills, fruiting. 2. Longridge Fell, July, 1896, *Wh.* Calder Valley above Oakenclough, Caton Moor, Fairsnape Clough, and Hindburn, *Wi.* Udale and Clougha. 1. Easegill, *Wi.*

Breutelia arcuata Schpr. Locally plentiful amongst the hills. 1. Easegill near Leck, July, 1898, and Middlebarrow, *Wi.* 2. Hindburn, *Wi.*

Leptobryum pyriforme Wils. 3. Sparingly on the sandhills at Lytham, with fruit, June, 1898, *Wh.*

Webera elongata, Schwgr. Rare. 1. In small quantity on Silurian rocks in Easegill, June, 1899.—*W. nutans* Hedw. Generally distributed, from the coast-line to the summit of Greygarth Fell.—Var. *longiseta* B. & S. On the fells. 2. Longridge Fell, July, 1898, *Wh.* Grizedale, July, 1898, *Wi.* Clougha. 1. Greygarth Fell.—Var. *bicolor* Schp. Rare. Greygarth Fell at 2100 ft., July, 1898, *Wi.*—*W. annotina* Schwgr. Rare. 2. Tootell Heights quarry, July, 1898, *Wh.*—*W. carnea* Schp. Not common. 2. Near Lancaster, Aug. 1897, *H.* Caton and Longridge, *Wh.* 3. Blackpool, Lytham, and Preesall, *Wh.*—*W. albicans* Schp. Frequent in damp places, especially by mountain rills, rarely fruiting. 2. By the Brock near Garstang, May, 1898, Calder Valley (fruit), and Lower Salter, *Wi.* Longridge Fell and Caton, *Wh.* Udale. 1. Easegill, *Wi.* 3. In damp hollows among sandhills, St. Annes, *Wh.*

Plagiobryum Zierii Ldb. Rare. 1. Upper Easegill, near Leck, in plenty at 1500 ft., July, 1898, *Wi.*

Bryum pendulum Schp. Contrary to their usual relationship, this is commoner than *B. inclinatum* in West Lancs. 3. Blackpool, 1895, Lytham, St. Annes, and Fleetwood, *Wh.* 2. Grizedale and Cabus, near Garstang, *Wi.* 1. Over Kellet and near Lancaster, *Wi.*—*B. Warneum* Bland. Rare. 3. St. Annes, July, 1898, *Wh.* —*B. lacustre* Bird. Rare. 3. St. Annes and Lytham, with fruit, June, 1898, and Fleetwood (?), barren, *Wh.*—*B. inclinatum* Bland. Frequent. 3. Rare on the sandhills, St. Annes, and Lytham, June, 1898, and Preesall Ridge, *Wh.* 2. Grizedale near Garstang, *Wi.*—Longridge Fell, *Wh.* 1. Over Kellet and Easegill, *Wi.*—*B. uliginosum* B. & S. Rare? 3. St. Annes, Nov. 1898, with fruit, *Wh.*—*B. pallens* Sw. Common in every district, localities too numerous for quotation. First record, Silverdale, April, 1898, *Wi.*—*B. bimum* Schreb. Frequent amongst the hills. 1. Haweswater, July, 1898, *Wh.* Easegill. 2. Lower Salter and Wolfhole Crag, *Wi.* Longridge Fell.—*B. pseudo-triquetrum* Schwg. Frequent amongst the hills, rare elsewhere. 2. Calder Valley above Oakenclough, July, 1898, with fruit, and Dale Gill, Hindburn, *Wi.* Udale, with fruit. 1. Easegill, *Wi.*—Var. *compactum* B. & S. Very rare. 3. On the sandhills near St. Annes, with fruit, June, 1898, *Wh.*—*B. affine* Ldb. Rare. 2. Longridge Fell, July, 1898, *Wh.* 1. Greygarth Fell, July, 1898, *Wi.*—*B. intermedium* Brid. On the sandhills at Lytham and St. Annes, June, 1898, *Wh.* 2. Near Fulwood, and Longridge village, *Wh.*—*B. cæspiticium* L. Common on walls, &c. 2. Lancaster, Aug. 1897, *H.* Stonyhurst and Longridge, *Wh.* Lancaster Moor. 1. Morecambe, *Wh.* Silverdale and Greygarth Fell, *Wi.* 3. Preesall, *Wh.*—*B. capillare* L. General, fruiting freely.—Var. *macrocarpum* Hübn. Frequent, fruiting. 1. Silverdale, June, 1898, and Leck, *Wi.* Halton, *Wh.* 2. Caton, *Wh.* Grizedale, *Wi.*—Var. *rosulatum* Mitt. Not uncommon, and usually barren, on tree trunks. 2. Near Mitton, June, 1898. Caton and Lancaster, *Wh.* 1. Heysham, Skerton, and near Snatchems, *Wh.*—Var. *flaccidum* B. & S. Rare. 1. Wood near Silverdale, *Wi.*—*B. atropurpureum* W. & M. Not uncommon. 3. St. Annes, March, 1898, and between Preesall and Pilling, *Wh.* 1. Silverdale, *Wi.* Trowbarrow, *Wh.* 2. Roadside near Chipping, *Wh.*—*B. murale* Wils. Native only on the scar limestone, sporadic on walls. 3. On walls, Fleetwood Barracks, with fruit, March, 1899, *Wh.* 1. Trowbarrow, Thrang End, Middlebarrow, and by the road from Silverdale to Haweswater, all on limestone rocks, fruiting, *Wh.*—*B. alpinum* Huds. Rare, and barren. 1. On Silurian rocks. Easegill, near Leck, Aug. 1898, *Wi.*—*B. argenteum* L. Generally distributed.—*B. roseum* Schreb. Very rare, not fruiting. 3. Amongst *Salix repens* near Fairhaven, June, 1898, *Wh.* Silverdale, *Wi.*

Mnium affine Bland. Rather rare, and always sterile. 2. Near Spade Mill reservoir, June, 1898, and swampy ground above Stonyhurst, *Wh.* 1. Near Burton.—Var. *elatum* B. & S. 1. Borwick, June, 1898, *Wi.* 2. Brock Bottom, *Wi.*—*M. cuspidatum* Hedw. Not common. 2. Hodder Valley, June, 1898, *Wh.* 1. Silverdale, with fruit, *Wh.* 3. Near Fairhaven, *Wh.*—*M. rostratum* Schrad.

Frequent generally, and very abundant in some districts. First record, Lancashire, Aug. 1897, *H.*—*M. undulatum* L. Very common, and widely distributed. First record, Ribchester, March, 1898, *Wh.*—*M. hornum* L. Very common in every district, especially in East.—*M. serratum* Schrad. Rare, by mountain streams. Dale Gill, Hindburn, June, 1898, *Wi.*—*M. orthorrhynchum* B. & S. Rare, or overlooked because rarely fruiting. 1. Easegill, with fruit, July, 1898, *Wi.*—*M. stellare* Reich. 2. Rocks by the River Brock, 1898, *Wi.* Hodder Valley, *Wh.*—*M. punctatum* L. Common in East and North, and often with fruit, rarer and usually barren in West. First record, by the Brock, Garstang, May, 1898, *Wi.*—*M. subglobosum* B. & S. Rare. Only on the fells? 2. Fairsnape Clough, with fruit, May, 1898, and Calder Valley, *Wi.*

Fontinalis antipyretica L. Common in streams. Reported from Ribble (March, 1898, *Wh.*), Lune, Wyre, Calder, Brock, Hodder, and Leck Beck. Always barren?—Var. *gracilis* Schp. 1. Leck Beck, Easegill, July, 1898, *Wi.* 2. Udale.—*F. squamosa* L. Rare, or passed over. 2. Udale.

Neckera crispa Hedw. Common on the limestone in North, rare elsewhere. 1. Easegill, April, 1898, Silverdale and Over Kellet, *Wi.* Yealand, *Wh.* Dalton Crag, &c. 2. Leagram and Whitwell. —Var. *falcata* Boul. 1. Near Haweswater, July, 1898, *Wh.*—*N. complanata* Hübn. Common in North, but rarely fruiting, less common in East and West. 2. Stonyhurst, March, 1898, and Caton, *Wh.* 1. Easegill, Leck Fell, Over Kellet, Silverdale (fruit), and Warton, *Wi.* Halton and Woodwell, *Wh.* 3. Cockerham, with fruit, *Wi.*

Homalia trichomanoides Brid. Frequent. 1. Gatebarrow, April, 1898, and Borwick, *Wi.* Easegill. 2. Longridge and Hodder Valley, *Wh.* 3. Cockerham, with fruit, *Wi.*

Pterygophyllum lucens Brid. Rather local. 2. Upper Hodder Bridge, March, 1898, *Wh.* Calder Woods, fruiting, and Lower Salter, Roeburndale, *Wi.*

Leucodon sciuroides Schwgr. Rare. 1. Halton, Nov. 1898, *Wh.*

Porotrichum alopecurum Mitt. Common on limestone, and occasionally fruiting, rarer elsewhere. 1. Silverdale, June, 1898, Borwick, and Over Kellet, *Wi.* Yealand, Woodwell, and Halton, *Wh.* 2. Calder Woods, *Wi.* Caton, *Wh.*

Leskea polycarpa Ehrh. Frequent on tree roots by rivers in the low country. 2. Near Ribchester, March, 1899, Lower Hodder Bridge, and Caton, *Wh.* 1. Crook of Lune, *Wh.*—Var. *paludosa.* Caton, July, 1898, *Wh.*

Anomodon viticulosus H. & T. Apparently restricted to the limestone districts of North and East. 1. Silverdale, March, 1898, Borwick, Over Kellet, and Warton, abundant, *Wi.* Yealand, *Wh.* Dalton Crag. 2. Whitewell, *Wh.*

Thuidium tamariscinum B. & S. Common and generally distributed. First record, Dolphinholme, March, 1897, *Wh.*—*T. recognitum* Ldb. On limestone only, rare. 1. Silverdale, April, 1898, *Wi.* Trowbarrow and Yealand, *Wh.* Dalton Crag.

Climacium dendroides W. & M. Rather common, and always

barren. 2. Fulwood !, 1892, *Yates* (in herb. *Miss Armitage*). Caton, *Wh.* Garstang, *Wi.* 1. Easegill, Gatebarrow, and Borwick, *Wi.* Yealand, *Wh.* Near Burton. 3. Lytham and St. Annes, *Wh.*

Orthothecium intricatum B. & S. Rare and barren. 1. Upper Easegill, Leck, July, 1898, and near Silverdale, *Wi.*

Isothecium myurum Brid. Frequent. 2. Caton, Sept. 1898, and Hodder Valley, *Wh.* With fruit in Brock Valley, Garstang, *Wi.* 1. Warton, Over Kellet, and Leighton Beck, Silverdale, *Wi.* Dalton Crag, with fruit.

Pleuropus sericeus Dix. Common in North and East, rare in West. First record, Lancaster, Aug. 1897, *H.*

Camptothecium lutescens B. & S. Frequent on the limestone of North, rare elsewhere. 3. St. Anne's, March, 1898, *Wh.* 1. Silverdale and Easegill, *Wi.* Yealand, *Wh.*

Brachythecium glareosum B. & S. Not common. 2. Garstang, Jan. 1878, Warton, Borwick, and near Haweswater, *Wi.* Silverdale, *Wh.* — *B. albicans* B. & S. Common on the sand-hills, rare elsewhere, and usually barren. 3. Lytham, with fruit, March, 1898, St. Annes, Southshore, Fleetwood, and Knott End, *Wh.* 1. Woodwell, *Wh.*—*B. salebrosum* B. & S. var. *palustre* Schp. Rare, and only on the coast. 3. St. Annes, June, 1898, Fairhaven and Fleetwood, *Wh.* — *B. rutabulum* B. & S. General, very common. First record, Garstang, Dec. 1876, *Wi.* — Var. *robustum* Schp. In damp grassy places, rare. 3. Bispham, July, 1898, and St. Annes, *Wh.* — Var. *plumulosum*. On the sand-hills, rare. 3. St. Annes, June, 1898, *Wh.* — Var. *longisetum*. Wet places, often amongst rushes. 2. Longridge, Nov. 1898, *Wh.* 1. Borwick, *Wi.* — *B. rivulare* B. & S. Frequent by streams, rarely fruiting. 2. Lower Hodder Bridge, March, 1898, and Longridge Fell, *Wh.* Garstang and Calder Valley, *Wi.*—Var. *chrysophyllum* Spr. Rare. 2. Lower Salter, *Wi.* — *B. velutinum* B. & S. Common, fruiting. 2. Ribchester, March, 1898, Longridge, Stonyhurst, Redscar, and Lancaster, *Wh.* Garstang, *Wi.* 1. Silverdale and Heysham, *Wh.* 3. Bispham and Lytham, *Wh.*—*B. populeum* B. & S. Not very common. 2. Garstang, Jan. 1877, *Wi.* Mitton, Longridge, Caton, and near Preston, *Wh.* 1. Halton, *Wh.* 3. Bare, *Wh.*—*B. plumosum* B. & S. Frequent in East, and usually fruiting. (Preston, 1892, *Yates* (in herb. *Miss Armitage*.) May have been in S. Lancs ?). 2. Lancaster, Aug. 1897, *H.* Garstang, Lower Salter, Calder Valley, and Brock Bottom, *Wi.* Hodder Valley, *Wh.* Udale. 1. Caton, *Wh.*—*B. purum* Dixon. General, but seldom fruiting. First record. 2. Dolphinholme, March, 1897, *Wh.* 1. With fruit on Warton Crag, *Wi.*

Hyocomium flagellare B. & S. Frequent in East by streams. 2. In the Brock, Fairsnape Clough, May, 1898, Upper Roeburndale and Hindburn, *Wi.* Longridge Fell, *Wh.* Udale. 1. Easegill.

Eurhynchium piliferum B. & S. Frequent in grassy bushy places. 1. Yealand, with fruit, July, 1898, and Halton, *Wh.* 2. Caton, Stonyhurst, and Whitewell, *Wh.* — *E. crassinervium* B. & S. 2. Hodder banks, 1886, *Holt*. Near Higher Hodder Bridge, June, 1898, *Wh.* Mr. Holt is uncertain whether his specimens were found

in Lancashire or Yorkshire. 1. On a wall between Heysham and Morecambe, *Wh.*—*E. prælongum* B. & S. Very common, and frequently fruiting. First record, Garstang, 1876, *Wi.*—Var. *Stokesii* L. Cat. 2. Dolphinholme, March, 1897, and Caton, *Wh.* Lancaster, *H.* Udale. 1. Silverdale and Yealand, *Wh.*— *E. Swartzii* Hobk. Frequent, seldom fruiting. 2. Near Preston, Jan. 1897, *Wh.* Lancaster, *H.* Garstang, *Wi.* 1. Halton and Silverdale, *Wh.* 3. Lytham, *Wh.* — *E. hians* Hedw. Rare. 2. Caton, by stream-side, Sept. 1898, *Wh.* Brock Bottom, *Wi.* — *E. pumilum* Schpr. Rare. 2. Caton, Sept. 1898, *Wh.* 1. Easegill. — *E. myosuroides* Schp. Frequent. 2. Kemple End, July, 1898, *Wh.* Garstang and Brock Bottom, *Wi.* 1. Halton, *Wh.* — *E. striatum* B. & S. Very common, but seldom fruiting. First record, Jan. 1877, *Wi.* — *E. rusciforme* Milde. Common in streams. First record, Brock, Dec. 1886, *F. C. King* (in herb. *Wheldon*).—*E. murale* Milde. Frequent on walls and stones. 2. Near Preston, Jan. 1897, fruiting, Stonyhurst, Caton, and Longridge, *Wh.* Lancaster, *H.* 1. Silverdale, *Wh.*—Var. *julaceum* Schp. 1. Silverdale, *Wh.* —Var. *complanatum* B. & S. 2. Brock Valley, near Garstang, *Wi.* —*E. confertum* Milde. General. First record, Garstang, 1876, *Wi.* —*E. megapolitanum* Milde. Rare. 3. St. Annes and Fairhaven, with fruit, Nov. 1898, *Wh.*

Plagiothecium depressum Dixon. Rare and sterile. 2. Upper Roeburndale, Oct. 1898, *Wi.*—*P. Borrerianum* Spr. Frequent, but never fruiting. 2. Longridge Fell, July, 1898, *Wh.* Bleasdale Fell, Calder Valley, Hindburn, and Brock Bottom, *Wi.* Udale and Clougha. 1. Between Lancaster and Halton, *Wh.* Easegill and Greygarth Fell. — *P. pulchellum* B. & S. Rare. Clougha, June, 1899. — *P. denticulatum* B. & S. Common, rarely fruiting. First record, Garstang, Jan. 1877, *Wi.* — Var. *majus* Boul. Rare. 1. Easegill, July, 1898, *Wi.* 2. Between Longridge and Stonyhurst, fruiting, *Wh.* Hindburn, *Wi.* — *P. sylvaticum* B. & S. Rare or overlooked. 2. Calder Woods, May, 1898, *Wi.* Redscar, near Preston, *Wh.* Between Halton and Lancaster, *Wi.*—*P. undulatum* B. & S. Common in the more hilly districts, very rarely fruiting. 2. Dolphinholme, March, 1897, and Longridge Fell, *Wh.* Calder Woods, Hindburn, and Grizedale, *Wi.* Udale, fruiting freely. 1. Easegill.

Amblystegium serpens B. & S. General, commonly fruiting. First record, Lancaster, Aug. 1897, *H.*—Var. *depauperatum* Boul. 3. On the sand-hills between Fairhaven and St. Annes, and near Southshore, May, 1899, *Wh.* — *A. irriguum* B. & S. Rare. Near Lancaster, Aug. 1897, *H.* — *A. filicinum* De Not. Common, rarely fruiting. 2. Ribchester, March, 1898, *Wh.* Longridge Fell, Hodder Valley, and Caton, *Wh.* Harris End Fell, Hindburn, and Brock Bottom, *Wi.* 1. Silverdale and Skerton, *Wh.* Yealand. — Var. *Whiteheadii* Wheld. Rare. 3. St. Annes, July, 1898, *Wh.*

Hypnum riparium L. 2. Ashton-on-Ribble, June, 1881, *F. C. King* (in herb. *Wheldon*). Lancaster, near Preston, and between Chipping and Whitewell, *Wh.*—Var. *longifolium* Brid. 1. Between

Morecambe and Snatchems, July, 1899, *Wh.*—*H. elodes* Spr. Rare. 3. St. Annes, March, 1898, *Wh.* 1. Shore of Haweswater, Silverdale, *Wi.*—*H. polygamum* Schp. Only on the coast sand-hills. 3. St. Annes, fruiting, June, 1898, Fairhaven, and Southshore, *Wh.* — Var. *stagnatum* Wils. St. Annes, *Wh.* — *H. stellatum* Schreb. Frequent, but not fruiting. 2. Upper Hodder Bridge, March, 1898, and Longridge Fell, *Wh.* Upper Roeburndale, *Wi.* 1. Silverdale, boggy places by Leighton Beck and Borwick, *Wi.* — Var. *protensum* B. & S. 2. Lancaster, Aug. 1897, *H.* Caton, Tootell Heights, between Mitton and Stonyhurst, and walls near Chipping, *Wh.*—*H. chrysophyllum* Brid. Not common. 2. Upper Hodder Bridge, March, 1898, *Wh.* 1. Silverdale and Lindeth, *Wh.*—*H. aduncum* Hedw. Rare? 2. Marshy ground near Preston, Jan. 1897, *Wh.* —Var. *gracilescens* Schp. 3. Not typical, because starved by drainage and fast disappearing, at St. Annes, June, 1898, *Wh.* — Var. *paternum* Sanio. St. Annes, very fine, in a pit where grows *Ranunculus Baudotii*, June, 1898, *Wh.*—(Var. *flexile* Ren. A form intermediate between this and var. *paternum*, but near the former, grows with *H. lycopodioides* at St. Annes, *Wh.* (teste *Renauld*))—Var. *polycarpon* Schp. 1. Ditches by foot-road from Morecambe to Snatchems, July, 1899, *Wh.*—*H. Sendtneri* Schp. 3. St. Anne's, barren, July, 1898, *Wh.*—*H. Wilsoni* Schp. 3. Still lingers at St. Annes, July, 1898, *Wh.* — Var. *hamatum* Ldb. St. Annes, July, 1898, *Wh.* (teste *Renauld*). — *H. lycopodioides* Schwgr. Rare. St. Annes, April, 1898, *Wh.*—*H. fluitans* L. Not common, except in parts of East. 2. Lower Bleasdale, July, 1898, and Bottom Head Fell, *Wi.* Longridge Fell, *Wh.* 1. Greygarth Fell, *Wi.* — Var. *falcatum* Schpr. 2. Calder Valley, *Wi.*—Var. near *hemineuron* Ren. et Card. Longridge Fell, February, 1898. Of similar plants from Pendle Hill (S. Lancs) Mons. Renauld wrote: "*H. fluitans* (*obsoletum* Sanio) *forma valde peculiaris.* Votre plante par de nervure souvent courte, bifurquée et des ouillettes non délimitées se rapproche de la var. *hemineuron* Ren. et Card. du Labrador, sans être identique." Mr. Dixon had previously referred them to group "*obsoletum*" Sanio.—*H. exannulatum* Gumb. In wet places on the hills, not very common. 2. Calder Valley above Oakenclough, July, 1898, and Bleasdale, *Wi.* Clougha. 1. Borwick Swamp, *Wi.* —Var. *brachydictyon* Ren. 2. Longridge Fell, July, 1898, *Wh.* (teste *Renauld*). — Var. *Rotæ* Schp. St. Anne's, July, 1898, *Wh.* —Var. *purpurascens* Schp. Calder Valley above Oakenclough, May, 1898, *Wi.*—*H. uncinatum* Hedw. Rare? 1. Easegill, Aug. 1898, *Wi.* 2. Udale, fruiting.—*H. revolvens* Sw. Not common. 1. Near Haweswater, May, 1898, *Wh.* 3. St. Annes, July, 1898, *Wh.* 2. Udale.—Var. *Cossoni* Ren. Udale, June, 1899 (and with it the peculiar *forma falcata* Sanio).—*H. intermedium* Ldb. Udale, June, 1899. — *H. commutatum* Hedw. Common in North and East, no records for West. First record. 2. Lancaster, Aug. 1897, *H.* Whitewell, with fruit, *Wh.* 1. Easegill, with fruit, *Wi.*—*H. falcatum* Brid. Rare. 1. Haweswater, July, 1898, *Wh.* (teste *Renauld*). Borwick Swamp, *Wi.* — *H. cupressiforme* L. Very variable, and

common in every district. First record, Garstang, Jan. 1877, *Wi.* —Var. *resupinatum* Schp. 2. Mitton, July, 1896, Hornby and Caton, *Wh.* Near Garstang, *Wi.*—Var. *lacunosum* Brid. 3. Abundant on the sand-hills, Lytham, and St. Annes, June, 1898, *Wh.*—Var. *mamillatum* Brid. 2. Kemple End, July, 1896, *Wh.* 1. Silverdale, *Wh.*—Var. *elatum* B. & S.? 1. Haweswater, April, 1898, *Wi.* —Var. *ericetorum* B. & S. Common in North and East on the fells, very rare in West. First record. 2. Dolphinholme, March, 1897, *Wh.* 3. Cockerham Moss, *Wi.* —Var. *filiforme* Brid. Common. First record, Preston, Jan. 1897, *Wh.* — *H. Patientiæ* Ldb. Rare, not fruiting. 2. Garstang, 1878, and Lower Bleasdale, *Wi.* 1. Easegill and Warton, *Wi.* — *H. molluscum* Hedw. Common, especially on calcareous rocks. 2. Lancaster, Aug. 1897, *H.* Caton and Longridge, *Wh.* Dale Gill, Bleasdale, and Calder Valley, *Wi.* 1. Abundant everywhere. 3. Near Preesall, *Wh.* — *H. palustre* L. Common in wet places, fruiting. 2. Kemple End, July, 1896, Stonyhurst, Redscar, Caton, &c., *Wh.* Lancaster, *H.* Hindburn, and Brock Bottom, *Wi.* 1. Near Leck and Upper Easegill, *Wi.*—Var. *subsphæricarpon* B. & S. 2. By the Hodder and Ribble, *Wh.* By the Brock, Garstang, *Wi.* Stream below Lickhurst, *Wh.* — *H. ochraceum* Turn. Rather rare, and barren. 2. Calder Valley above Oakenclough, May, 1898, Lower Salter, and Middle Gill, Hindburn, *W.* Udale. 1. Easegill, *Wi.* — *H. stramineum* Dicks. Locally plentiful on some of the fells. 2. Calder Valley above Oakenclough, May, 1898, Fairsnape Fell and Hindburn, *Wi.* 1. Easegill, *Wi.*—*H. cordifolium* Hedw. Frequent in boggy places. 2. Ribchester, March, 1898, *Wh.* Barnacre, near Garstang, *Wi.* 1. Silverdale, *Wh.* Between Caton and Borwick, *Wi.* Near Burton. 3. St. Annes, *Wh.*—*H. cuspidatum* L. Very common in all three districts, but rather rarely fruiting. 2. Ribchester, with fruit, March, 1898, *Wh.* Garstang and Hornby, with fruit, *Wi.* 1. Borwick and Over Kellet, with fruit, *Wi.* — *H. Schreberi* Willd. Common in East, frequent in North, rare in West. First record, Longridge Fell, July, 1896, *Wh.*

Hylocomium splendens B. & S. Common in North. Rare or unknown in parts of East and West. First record, Hodder Valley, July, 1896, *Wh.* — *H. brevirostre* B. & S. Rare. 1. Trowbarrow, July, 1898, *Wh.*—*H. loreum* B. & S. Not common generally, but locally abundant in parts of East. 2. Calder Valley above Oakenclough, May, 1898, and Hindburn, *Wi.* Udale. — *H. squarrosum* B. & S. General. First record, Dolphinholme, March, 1897, *Wh.* —*H. triquetrum* B. & S. General, especially abundant in North. First record, Stonyhurst, July 1896, *Wh.* — *H. rugosum* De Not. Very fine and locally abundant on the scar limestone of North, unknown elsewhere. 1. Thrang End, April, 1898, *Wi.* Trowbarrow, and between Silverdale and Haweswater, *Wh.* Dalton Crag.

Hepaticæ.

Frullania Tamarisci L. 1. Silverdale, July, 1898, *Wh.* Easegill. 2. Udale.—*F. fragilifolia* Tayl. Easegill.—*F. dilatata* L. 1. Silverdale, July, 1898, and Stonyhurst, *Wh.* Over Kellet, *Wi.*

Easegill and Dalton Crag. 2. Between Crumpax and Loud Lower Bridge, and near Leagram Hall, *Wh.*

Lejeunia Mackaii Hook. 1. Yealand, 1898, *S.* Woodwell and Trowbarrow, *Wh.* Over Kellet, *Wi.*—*L. serpyllifolia* Dicks. 1. Caton, Aug. 1898, *Wh.* Easegill, *Wi.* 2. Near Whitewell, *Wh.* Udale.

Radula complanata L. 1. Silverdale, June, 1898, *Wh.*

Porella lævigata Schrad. 1. Silverdale and Trowbarrow, June, 1898, *Wh.*—*P. platyphylla* L. Common on the limestone of North. 1. Woodwell, July, 1898, Silverdale and Thrang End, *Wh.* Warton and Over Kellet, *Wi.* Dalton Crag.

Blepharozia ciliaris L. 2. N. side of Longridge Fell, June, 1898, *Wh.* Udale.

Trichocolea tomentella Ehrh. 1. Woodwell, July, 1898, *Wh.* Easegill near Leck, *Wi.*

Lepidozia cupressina Sw.—Var. *tumidula* Carr. 2. Clougha, 1881, *S.*—*L. reptans* L. 2. Longridge, July, 1896, and Caton, *Wh.* Near Garstang, *Wi.* Udale and Clougha.

Bazzania trilobata L. 2. Clougha, June, 1899.

Kantia trichomanis L. 2. Longridge, July, 1896. Hodder Valley and Ribchester, *Wh.* Garstang, *Wi.* Clougha and Udale. 1. Caton and Easegill. 3. Lytham, *Wh.*

Cephalozia bicuspidata L. 2. Longridge, July, 1896, Stonyhurst, Caton, Preston, and Lancaster, *Wh.* Garstang and Hindburn, *Wi.* Udale. 3. Lytham, St. Annes, Fleetwood, and Preesall, *Wh.* 1. Silverdale and Heysham, *Wh.*—*C. Lammersiana* Hub. Pilling, *Wh.*—*C. lunulæfolia* Dum. 2. Kemple End, July, 1898, *Wh.* Udale.—*C. sphagni* Dicks. 2. Udale, June, 1899.—*C. fluitans* Nees. 2. Longridge Fell, July, 1898, *Wh.* 3. Cockerham Moss, *Wi.*—*C. divaricata* Sm. 2. Longridge, July, 1896, and Caton, *Wh.* Udale.

Scapania aspera Mull. & Bern. Locally abundant on limestone rocks. 1. Silverdale, July, 1898, *Wh.* Over Kellet, *Wi.* Easegill and Dalton Crag.—*S. undulata* L. 2. Longridge Fell, July, 1898, *Wh.* Clougha and Udale. 1. Easegill.—*S. purpurea* Dill. 2. Longridge Fell, July 1896, *Wh.* Hindburn, *Wi.* Clougha and Udale.—*S. curta* Mart. 2. Easegill.

Diplophyllum albicans L. 2. Longridge, Nov. 1898, *Wh.* Garstang and Hindburn, *Wi.* Clougha and Udale. 1. Easegill and Greygarth Fell.

Lophocolea bidentata L. 1. Silverdale, July, 1898, and Caton, *Wh.* Over Kellet, *Wi.* 2. Fulwood, Stonyhurst, and Mitton, *Wh.* Brock Bottom, *Wi.* St. Annes and Knott End, *Wh.*—*L. heterophylla* Schrad. 2. Stonyhurst and Hodder Valley, Feb. 1899. Caton, *Wh.* 1. Halton, and between Morecambe and Snatchems, *Wh.*

Chiloscyphus polyanthos L. 2. R. Calder near Garstang, April, 1899, *Wi.* Whitewell, *Wh.*—Var. *rivularis* Nees. 2. Longridge Fell, July, 1898, *Wh.* Hindburn, *Wi.* Udale. 1. Easegill.—*C. pallescens* N. ab. E. Near Pilling, 1898, *Wh.*

Mylia Taylori Hook. 2. Botton Head Fell, May, 1899, *Wi.* Clougha.—*M. anomala* Hook. 3. Cockerham Moss, Aug. 1898, *Wi.*

Plagiochila asplenioides L. 2. Caton, Aug. 1898, and Hodder Valley, *Wh.* 1. Silverdale and Arkholme, *Wi.* Halton, *Wh.*—Var. *minor* Carr. Silverdale, *Wh.*—*P. spinulosa* Dicks. 1. Easegill near Leck, Aug. 1898, *Wi.* Greygarth Fell.

Jungermannia cordifolia Hook. Longridge Fell, March, 1898, *Wh.* Udale. 1. Above Easegill Kirk, *Wi.* Near Leck.—*J. inflata* Huds. 2. Longridge Fell, Nov. 1898, *Wh.*—*J. sphærocarpa* Hook. Near Kemple End, June, 1898, *Wh.* Hindburn, *Wi.* 1. Easegill.—*J. Flœrkii* W. & M. 2. Longridge Fell and Tootle Heights, Aug. 1898, *Wh.*—*J. barbata* Schmid. 2. Longridge Fell, Feb. 1898, *Wh.* Udale.—*J. Lyoni* Tayl. 2. Easegill near Leck, Aug. 1898, *Wi.* — *J. gracilis* Schleich. 2. Clougha, 1881! *S.* Udale.—*J. capitata* Hook. 2. Udale.—*J. porphyroleuca* N. ab. E. 2. Udale.—*J. ventricosa* Dicks. 2. Above Kemple End, June, 1898, *Wh.* Whitmoor, *Wi.*—*J. minuta* Crantz. 2. Clougha, June, 1899. —*J. crenulata* Sm. 2. Longridge Fell, July, 1898, *Wh.* Udale.

Eucalyx obovata Nees. 2. Longridge Fell, Aug. 1898, *Wh.* Udale. 1. Easegill near Leck, *Wi.*

Nardia scalaris Schrad. 2. Jeffrey Hill, Longridge, March, 1898, and near Chipping, *Wh.* Middle Gill, Hindburn, *Wi.* 3. St. Annes, *Wh.*

Marsupella emarginata Ehrh. 2. Longridge Fell, Nov. 1898, *Wh.* Udale.

Pellia epiphylla L. 3. Blackpool, July, 1898, and Pilling, *Wh.* 1. Skerton, *Wh.* Easegill. 2. Udale.—Var. *crispa* N. ab. E. 2. Caton, *Wh.*—*P. calycina* Tayl. 3. St. Annes, June, 1898, *Wh.* 2. Hindburn, *Wi.* Longridge, *Wh.*

Aneura multifida L. Stream near Stonyhurst, March, 1899, and near Loud Lower Bridge, *Wh.*—*A. pinguis* L. 1. Skerton, June, 1898, Longridge Fell and Caton, *Wh.* Udale.—*A. sinuata* Dicks. 2. Udale.

Metzgeria pubescens Schranck. 1. Easegill near Leck, Aug. 1898, and Over Kellet, *Wi.* Silverdale, *Wh.*—*M. furcata* L. 1. Silverdale, June, 1898, Thrang End and Yealand, *Wh.* Over Kellet, *Wi.* Dalton Crag and Easegill. 2. Hodder Valley, *Wh.* Udale.—*M. conjugata* Lindb. 1. Thrang End, July, 1898, *Wh.*

Marchantia polymorpha L. In every division.

Conocephalus conicus L. 1. Silverdale, July, 1898, *Wh.* 2. Caton, and between Mitton and Stonyhurst, *Wh.*

Reboulia hemisphærica L. 1. Dalton Crag.

Chomiocarpon quadratus Scop. St. Annes, July, 1898, *Wh.* 1. Easegill. 2. By the Hodder near Whitewell, *Wh.*

NOTES ON NORTH NORFOLK PLANTS.

By James Saunders.

During a brief holiday at Wells, Norfolk, in August, 1899, and at Sheringham, 1898, the following plants were noticed. Most of these have already been recorded for the Watsonian vice-counties (27 East Norfolk and 28 West Norfolk) in which the districts are situated, but their interest as recent records may warrant their publication.

The most interesting stations visited were two sandy flats, which are apparently inundated in winter. These are situated amongst the sand-dunes about midway between the entrance to Wells Harbour and Holkham Bay, on the seaward side of the pine trees which form a conspicuous feature of this part of the landscape. The most noteworthy species observed was in the more easterly of these sand-flats. This is a form of *Gnaphalium luteo-album* L., of which there were some hundreds of plants, which whitened a considerable area with their downy foliage and stems. All of them were unbranched, most were erect in habit, and only a few were slightly decumbent at the base. I think there can be no doubt that it is native in the locality specified, which is remote from houses, uninfluenced by agricultural operations, and out of the track of the ordinary tourist.

Associated with the *Gnaphalium* were many thousands of *Erythræa pulchella* Fries, from one to two inches high. This is given in Hooker's *Student's Flora* as a subspecies of *E. Centaurium* Pers., but when the two forms are seen in company, as in this instance, their wide dissimilarity in habit and in the colour of the corolla seems to warrant specific rank.

It should be remarked that the excessively dry summer of 1899 evidently affected the development of several species that grew on these sand-flats. This was especially noteworthy in *Gnaphalium luteo-album*, *Erythræa pulchella*, *Glaux maritima*, *Polypogon monspeliensis*, and *Statice caspia*, all of which had a more or less starved habit; even *Juncus compressus* in its unusually shortened stature gave evidence of a diminished supply of moisture. In *Elymus arenarius* the fruiting stems were nearly all damaged by smut; probably not more than five per cent. had escaped its ravages.

While on the subject of Norfolk plants, it may be mentioned that on Beeston Bog, near Sheringham, and also on the marsh near Holt, *Drosera anglica* is the common sundew, *D. rotundifolia* is comparatively rare, and *D. intermedia* is either very rare or quite absent. This is almost the reverse of what occurs in the New Forest.

Sisymbrium Sophia L. Plentiful on waste ground, Sheringham.
Drosera anglica Huds. Beeston Bog, Holt.
Eryngium maritimum L. Holkham.
Bupleurum tenuissimum L. At the east ends of the Wells golf-links, on the banks of a pool.

Gnaphalium luteo-album L. Amongst sand-dunes between Wells and Holkham.

Filago minima Fr. Sand-flats amongst the pines near Wells.

Lactuca virosa L. Sand-hills, Holkham.

Inula Conyza DC. Sand-hills, Holkham.

Cuscuta europæa L. Abundant on gorse, Beeston Bog.

Statice Limonium L. Mud-flats near Wells. — *S. auriculæfolia* Vahl. Sand-dunes near Wells. — *S. caspia* Willd. Sand-dunes near Wells; shore near Staithe.

Erythræa pulchella Fries. Plentiful on a sandy flat between Wells Harbour and Holkham Bay.

Beta maritima L. Plentiful near Wells.

Atriplex portulacoides L. Mud-flats near Wells.

Salicornia radicans Sm. Mud-flats near Wells.

Suæda fruticosa Forsk. On the embankment by Wells Harbour.

Salsola Kali L. Sea-shore near Wells and Holkham.

Spiranthes autumnalis Rich. Near Holt.

Epipactis palustris Sm. Beeston Bog.

Polypogon monspeliensis Desf. Amongst the sand-dunes near Wells.

Triticum pungens Roem. & Sch. and *T. junceum* L. Sandy shore near Wells and Holkham.

Elymus arenarius L. Sandy shore near Wells and Holkham.

GNAPHALIUM LUTEO-ALBUM IN EAST ANGLIA.

By James Britten, F.L.S.

When Mr. Saunders sent me specimens for comparison of the plant found by him at Wells, as recorded in the preceding paper, I looked up the various records for *Gnaphalium luteo-album* in East Anglia which seemed to me to strengthen the view that the species is a native of that province. It may be worth while to print these records in a connected form; there may be others which I have overlooked, as my search has not been exhaustive.

Cambridgeshire.—The plant was first recorded as British in *English Botany*, t. 1002 (March 1, 1802), where the following account is given of its occurrence:—"Our specimen is of English growth, and, as Mr. Relhan thinks, indubitably wild, having been found by him in the road from Hanxton [Hauxton] to Little Shelford, Cambridgeshire, far from any house (nor is it, indeed, a garden plant); also in a gravel-pit a quarter of a mile from the road. We give it on that gentleman's authority; and the only question can be, whether its very volatile seeds could have been wafted thither from the botanic garden at Cambridge."

This locality is repeated by Relhan (Fl. Cantab. ed. 3, p. 337 (1820)). Babington, however, searched for the plant in vain: he enters it as "Probably introduced, but admitting some doubt on the subject"; and adds, "I cannot find the plant by the roadside,

and the gravel-pit I believe to be levelled and cultivated" (Fl. Cambs. 127 (1860)). The *English Botany* figure is curiously unlike the ordinary form of the plant, which is the more strange in that the specimens from which it was drawn are quite typical.

Norfolk.—The first record seems to be that in ed. ii. of Hooker's *British Flora*, p. 355 (1831): "Fields, Larlingford, Norfolk. Rev. G. R. Leathes." The locality is repeated in Trimmer's Flora of the county (1866), but only with a reference to Hooker's *Flora*.

Suffolk.—"Very rare: Eriswell," Henslow & Skepper, Fl. Suffolk, 45 (1860). In Hinds' Fl. Suffolk it is entered as "now extinct," but it is stated to have been found at Eriswell by F. K. Eagle in 1852; a specimen from him is in Miss Lathbury's herbarium (Hinds, *l.c.*), and another in Herb. Brit. Mus. Mr. Arthur Bennett, however, in this Journal (p. 323) says that in August, 1896, Mr. Burkill had a fragment sent him for identification from Mildenhall, which is within a short distance of Eriswell. Mr. Burkill can supply no further information about it.

The plant is recorded on Sherard's authority in Ray's *Synopsis*, ed. 2, p. 82 (1696), as growing "in the Isle of Jersey on dry banks and walls, very common." We have a specimen from Samuel Dale, labelled "a Dño Rand accepi Anno 1714. Angliæ est indigena"; but this may refer to the Jersey locality, which would by that time have become well known. There are specimens in Herb. Banks collected by Gosselin in Guernsey in 1790. Blackstone (*Specimen Botanicum*, p. 28 (1746)), records it from "a mile above the first of Bognor Rocks, Sussex. Mr. Hill"—a locality in which, according to T. H. Cooper (Appendix to Horsfield's *History of Sussex* (1835)) as quoted by Watson (Cyb. Brit. ii. 101), Mr. Borrer sought it in vain. This was probably an erroneous record; while in the Liverpool locality—"on the site of the old Botanic Garden at Crown-street" (Hall, Fl. Liverp. 62 (1839))—it was of course a mere introduction.

WILLIAM PAMPLIN—1806-1899.

On August 5th there died at the village of Llandderfel, near Bala, in Merionethshire, in his ninety-third year, one who, while himself no mean botanist, was probably as well known among the leading botanists of the middle of the century as any one of themselves. This was William Pamplin, who at one time carried on the business of a botanical publisher and bookseller at 45, Frith Street, Soho Square, now conducted by Messrs. Dulau & Co.

Mr. Pamplin relinquished his business in 1863. He had, however, some time previously, taken up his residence at Llandderfel, having been attracted by the delightful scenery of the Upper Dee valley. His first visit to North Wales was made many years before this, in company with his friend Dr. Thomas Shearman Ralph, the author of the *Icones Carpologicæ*. So vivid an impression did this tour leave on Mr. Pamplin's memory, that, when weak and bed-

ridden in the ninety-second year of his age, he was able to recount to the writer every detail of the tourists' progress among the mountains of North Wales, and to recall with delight his first impressions of the Pass of Aberglaslyn. Among scenes of so much natural beauty he desired to end his days, and in the peaceful village of Llandderfel he lived in retirement for nearly forty years, a period in itself an ordinary lifetime. The portrait which we reproduce was taken in his ninety-second year,

William Pamplin was born in 1806, at Lavender Hill, Wandsworth, where his father was established as a nurseryman; to this are probably due the son's lifelong interest in botany, and the devotion of his business mainly to the sale and publication of works dealing with that science. It was here that he published, in 1827, the little "Catalogue of the rarer indigenous plants of Battersea and Clapham," a perusal of which, having regard to the present state of that district, produces feelings similar to those with which we read Gerard's account of the London plants of his day.

A perusal of the files of the *Phytologist* shows that Mr. Pamplin had a genuine love of botanical study. Some of his contributions to that periodical are of a bibliographical character, suggested by the books and botanical collections which passed through his hands. Such are 'Lists of Habitats of Plants recorded in a MS. in a copy of Blackstone's Specimen Botanicum' (1848); and 'MS. notes and additions in a copy of Ray's Catalogus Plantarum Angliæ' (1852). There are several notes which indicate that he was a diligent student of the Flora of the neighbourhood of London. He records, for example, the re-discovery of a white-flowered variety of *Geranium Robertianum* between Chiselhurst and Bromley, in a locality given by Ray. In 1854 he published a 'List of the Plants of Streatley, Berks, and Goring, Oxon,' in which he embodied the

observations made during several visits between 1836 and 1854. He also contributed to the *Magazine of Natural History* in 1836 and 1839.

In 1854 Mr. Pamplin accompanied Mr. Alexander Irvine on a pedestrian botanical tour through North Wales. The experiences and discoveries of the travellers are recorded, somewhat discursively, in the first volume of the new series of the *Phytologist*, of which Mr. Irvine was editor. In 1856, in company with the same friend, Mr. Pamplin made a three weeks' tour in the Highlands of Perthshire. The results of their investigations were again given in the *Phytologist*, and afterwards published in a separate form. After his retirement Mr. Pamplin endeavoured to establish, at his home at Llandderfel, a Central Botanical Garden for North Wales.

It was, however, by his enterprise as a publisher that Mr. Pamplin was best known among his contemporaries of the fourth and fifth decades of the century. A complete list of all the works whose publication he undertook would be interesting, but out of place here. The mention of the more important will, however, suffice to show that he issued some notable books. Sir W. J. Hooker's *Species Filicum*, a work in five volumes, appeared between 1856 and 1864; the same author's *Century of Ferns* and *Second Century of Ferns*, in 1854 and 1857; Boott's *Illustrations of the Genus Carex* in 1858; we may add Hooker and Thomson's *Flora Indica*, Thwaites's *Enumeratio Plantarum Zeylaniæ*, and Bromfield's *Flora Vectensis*. Mr. Pamplin also published Ralph's reprint of the works of Thomas Johnson.

When, in 1854, on the death of Mr. Luxford, its editor, the publication of the *Phytologist* was suspended for a time, it was Mr. Pamplin who, in May, 1855, undertook the issue of the new series. Considering the depressing experience of those responsible for its earlier publication, one cannot but regard this undertaking on the part of the publisher rather as a disinterested labour of love, than as an enterprise affording a prospect of pecuniary profit. It is to be feared that loss rather than gain was the result of the experiment, and the *Phytologist* ceased altogether on the retirement of Mr. Pamplin in 1863.

It was doubtless the knowledge of the interest which Mr. Pamplin took in the progress of botany, and of his known probity as a man of business, that secured for him the regard, and in many cases the friendship, of the leading British botanists of his time. He had also an unusually large acquaintance among Continental botanists, who rarely failed to call at his shop at Frith Street, on the occasion of a visit to this country. His very considerable foreign business was due in part to the circumstance that he had succeeded to the bookselling business of Mr. Hunneman, whose daughter Caroline became his first wife. Mr. Hunneman was also an Associate of the Linnean Society, whose services to botany are commemorated by the genus *Hunnemania*.

Mr. Pamplin was elected an Associate of the Linnean Society on Jan. 19th, 1830, while still an assistant in his father's nursery, so

that at the time of his death he had been a member for nearly seventy years! He was accustomed to recall with enthusiasm the sayings and doings of the great botanists whom he had met at the Society's meetings.

REGINALD W. PHILLIPS.

SHORT NOTES.

POTAMOGETON DRUCEI Fryer.—This species flowered last summer profusely from July to September, and most of the spikes were thinly fruited, but so regularly as to alter the opinion I had formed as to its being a hybrid. The fruit is very unlike that of any European *Potamogeton*, and Mr. Bennett has not been able to match it with any extra-European species known to him. The drupelets are acutely keeled, with a series of tubercles along the keel, rarely well developed, but always indicated. The stolons bearing winter buds, thrown out from the decaying stems, are unlike those of any species known to me. In view of these distinct characters, it will be better to omit the sign of hybridity attached to the plant in my *Monograph of the Potamogetons of the British Isles* (p. 31), and to rank the plant as a full species. I hope to publish in this Journal a series of illustrations showing the life-history of this remarkable species from the winter-bud to the mature fruiting spike, drawn from time to time, as occasion offers, by my friend Mr. Robert Morgan, so that the readers of this Journal may have the life-history of the species set before them more clearly than any description could possibly do.—ALFRED FRYER.

DEVON AND SOMERSET EUPHRASIÆ. — The following species of *Euphrasia* have lately been identified for me by Mr. F. Townsend; they were all collected in 1898, and are, as far as I can ascertain, new to Devon North and Somerset South, vice-counties 4 and 5:— *E. nemorosa* H. Mart. (4) Roadside between Lynmouth and Countisbury. (5) Field at Worthy, Porlock Weir; near County-gate near Malmsmead; near farm on hills behind Porlock Weir. —*E. gracilis* Fr. (4) Badgeworthy Valley. — *E. Scotica* Wettst. (4 & 5) Badgeworthy Valley. — *E. Rostkoviana* Hayne. (4) Road-side between Lynmouth and Countisbury. — *E. Kerneri* Wettst. (5) By roadside, Oareford.—C. E. SALMON.

DROSERA ANGLICA IN HAMPSHIRE.—My son Edgar, when recently in the New Forest, saw a plentiful growth of this species in a spongy bog near Hatchet Pond, Beaulieu. This makes the third station for this plant in the New Forest; these are Holmsley Bog, the locality above mentioned, and I also saw one plant in another spot some ten years since, but the exact position has now slipped from my memory. The known distribution of the species in the New Forest is such that there is no fear of its extinction.—JAMES SAUNDERS.

*ARTICLES IN JOURNALS.**

Bot. Centralblatt (No. 46).—W. Rothert & W. Zalenski, 'Ueber eine besondere Kategorie von Krystallbehältern' (concl.). — P. Sorauer & G. Ramann, 'Sogennante unsichtbare Rauchbeschädigungen' (concl.).—(No. 47). B. Leisering, 'Ueber die Entwickelungsgeschichte des interxylären Leptoms bei den Dicotyledonen' (3 pl.).

Bot. Gazette (25 Sept.). — F. L. Stevens, 'Compound oosphere of *Albugo Bliti*' (4 pl.).—C. A. Cunningham, 'Bacterial disease of Sugar Beet' (5 pl.). — B. L. Robinson, 'N. American species of *Tephrosia*.'

Bot. Notiser (häft 5: 2 Nov.). — S. Murbeck, 'Die nordeuropäischen Formen der Gattung *Stellaria*.'— C. J. Svendsen, 'Ueber ein auf Flechten schmarotzendes *Sclerotium*' (1 pl.). — J. Hulting, 'Några ord om *Fagus silvatica* et la vegetationen på densamma.'

Bot. Zeitung (16 Nov.).—L. Jost, 'Die Theorie der Verschiebung seitlicher Organe durch ihren gegenseitigen Druck' (1 pl.).

Bull. de l'Herb. Boissier (31 Oct.). — E. Hackel, 'Enumeratio Graminum Japoniæ' (concl.).—F. Stephani, 'Species Hepaticarum' (cont.). — O. & B. Fedtschenko, 'Flore du Caucase.' — P. de Palésieux, 'Blatt der Melastomaceen' (concl.: 3 pl.).

Bull. Torrey Bot. Club (16 Oct.).—D. T. MacDougal, 'Symbiosis and Saprophytism' (3 pl.).—A. J. Grant, 'Revision of N. American *Scleropodium*.'—P. A. Rydberg, 'New Species from Western States.' —A. A. Heller, 'Plants from Western N. America.'

Erythea (31 Oct.). — S. B. Parish, 'Plants of S. California.'— E. W. D. Holway, 'Californian *Uredineæ*.' — C. V. Piper, 'North Western Plants.'—W. L. Jepson, 'Vegetation of Mount St. Helena.'

Gardeners' Chronicle (28 Oct.). — 'The neglect of Systematic Botany.'

Journal de Botanique ("Juillet": received 28 Oct.).—L. Mangin, 'La membrane des Mucorinées' (1 pl.).—G. Laradoux, 'L'appareil pilifère des Verbascées indigènes.' — J. Offner, 'Capitule d'*Inula glutinosa* à prolifération latérale.' — ("Août": received 14 Nov.). M. Col, 'Recherches sur l'appareil sécréteur des Composées.'— (Juillet & Août). A. Franchet, 'Plantarum sinensium' (*Cupuliferæ; Coniferæ*). — J. Amann, 'Application de la loi des grands nombres' (concl.).

Journ. Linn. Soc. (Bot.: 1 Nov.). — E. S. Barton, '*Notheia anomala*' (3 pl.). — F. N. Williams, '*Caryophyllaceæ* of Province of Sze-chuen.'

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* The dates assigned to the numbers are those which appear on their covers or title-pages, but it must not always be inferred that this is the actual date of publication.

Oesterr. Bot. Zeitschrift (Nov.). — K. Fritzch, ' Zur Systematik der Gattung *Sorbus:* die europäischen Arten und Hybriden.' — V. Schiffner, ' Ueber einige *Hepaticæ* aus Japan.' — C. Warnstorf, 'Bryologische Ergebnisse einer Reise des Dr. Matz durch die iberische Halbinsel.'

Rhodora (Nov.).—A. G. Leavitt, 'Adventitious plants of *Drosera* ' (1 pl.). — J. Holden, ' New Marine Algæ from Bridgeport, Conn.' (1 pl.).

BOOK-NOTES, NEWS, &c.

John Whitehead, who was born at Muswell Hill on June 30, 1860, died at the port of Hoi-Kow, China, on the 2nd of last June. Hewas an ornithologist who, while making collections of birds in Borneo and the Philippines, incidentally collected plants, which he presented to the National Herbarium. Some of these proved to be new, and were described in this Journal, principally by Dr. Rendle in 1896 (pp. 355–358). In 1893 Whitehead published in a hand-some quarto volume the zoological results of his *Exploration of Kina Balu.* He is commemorated in *Rhododendron Whiteheadii* Rendle.

The Kew *Bulletin* for " September and October " (published at the end of October) is mainly devoted to Fungi. Mr. Massee has a Revision of *Tilletia* (with a plate) and a large number of descriptions of new species under the heading " DCLVIII. Fungi Exotici, II." We wonder how long the useless practice of numbering each article (and that in Roman numerals) will disfigure the pages of the *Bulletin.* The remaining articles are of no botanical interest.

The fifth fascicle of the Set of British Hieracia recently sent out by Messrs. Linton contains fourteen endemic forms:—*H. callisto-phyllum* var. *cremnanthes; H. anglicum* var. *jaculifolium; H. breadalbanense; H. lasiophyllum* var. *planifolium; H. Sommerfeltii* var. *tactum; H. hypochœroides* var. *Cyathis; H. aggregatum* var. *prolongatum; H. Pictorum* var. *dasythrix! H. cymbifolium; H. diaphanum* var. *cacuminum; H. sciaphilum* var. *pulchrius; H. rigidum* var. *nidense; H. strictum* var. *subcrocatum; H. strictum* var. *amplidentatum.* The following note accompanies the set:— "Our British species of [*H. atratum*] is not in all points identical with Fries' plant; the phyllaries in ours are a little more floccose, and the ligules glabrous or glabrate; hence it is designated *H. atratum* Fr., f. [forma]. *H. anglicum* var. *jaculi-folium* has not, so far, been found outside the English Lake District. *H. breadalbanense* is a frequent form of the Breadalbane Hills; it is distinguished from forms of *H. rivale* by its more entire and rounded yellow-green leaves, its more hairy less setose heads, and more or less pilose ligules. *H. Schmidtii* is as near the type as we have in Britain. *H. aggregatum* var. *prolongatum* is a frequent form in the Breadalbanes, the aggregation of the inflorescence being accentuated

in cultivation. *H. Pictorum* var. *dasythrix* is a form (or species) which comes between *Pictorum* and *rivale*, and perhaps includes some of the forms mentioned under *H. rivale* var. *subhirtum* in Journ. Bot. 1894, 228; its shaggy white heads are perhaps its most distinctive feature. *H. gravestellum* var. *rhomboides*, f. was so named by Dr. M. Elfstrand, as a modification of the variety; the heads are thickly clothed with black hairs and setæ, and the leaves are less characteristically rhomboidal than those of the normal variety. *H. vulgatum* var. *dædalolepium* is the prevailing form of this species on the hills and slopes about the slate-quarries of Carnarvonshire and Merioneth. *H. strictum* var. *subcrocatum* is in the heads very close to the type in Lindeberg's Set, but in foliage and habit related to *crocatum* and *corymbosum;* it is widely distributed in Britain, reaching from the extreme North of Scotland to North Derbyshire, and Carnarvonshire in Wales. *H. crocatum:* the specimens distributed are not fully identical with the type, but agree, as Aman. Dahlstedt remarked on this Braemar plant, with 'the more hairy form of the northern parts of Norway.'" So much material remains, and so many British forms are not, so far, represented in the set, that the distributors purpose issuing one more and concluding fascicle, which will comprise all that can be got together in reasonable time.

The biographical notices of deceased Fellows in the *Proceedings* of the Linnean Society are so valuable as records of scientific workers that we regret to notice in the recent part (from Nov. 1898 to June, 1899) the introduction of details suited rather to a local newspaper than to the proceedings of a learned body. A whole page, for example, is devoted to a biography of one Fellow whose chief qualification for fame seems to have been the possession of "a light tenor voice of exceptional range and beautiful quality," and we are even favoured with a quotation from the ballad—not of a high order—which he sang "on the evening before his death"! It is of course true that the Linnean Society imposes no scientific test upon candidates for admission to its ranks, but it can hardly be necessary to make the fact conspicuous by the publication of notices like the one in question.

Dr. Arthur H. Burtt sends a copy of his inaugural dissertation for the doctor's degree at Tübingen University. It is entitled *Ueber die Habitus der Coniferen*, and is a study in phytometry which should be of special interest to students of forestry. We find in the Conifers representatives of a monocormic type, where, as in *Araucaria excelsa*, one strong main axis bears lateral branches of bilateral structure, which are so innately lateral that they cannot replace the main axis if the latter be removed. On the other hand, there is the polycormic type, well shown in the fastigiate Irish Yew, where there are a number of erect radial axes. Between the extreme forms are numerous gradations, and the study of the relation between main axis and branch and between primary branch and secondary branch, and so on, as determining the habit of a given species, is the burden of Dr. Burtt's dissertation. It com-

prises series of measurements of the angle between any given axis and its branch, and the length of the internodes on axes of different degrees, and is accompanied by explanatory diagrams and sketches.

Mr. F. Guthrie died in October at his residence at Claremont, Cape Town. He was B.A. and LL.B. of London University, and went to South Africa about twenty-five years ago, where he practised as an advocate, after which he taught for some time at Graaf-Reinet. In 1888 he was appointed Professor of Mathematics at the South African College, which position he held till the end of 1898, when he retired on account of ill-health. During the last eighteen months he had been engaged with Mr. Bolus in preparing the *Ericaceæ* for the continuation of the *Flora Capensis*. His help is acknowledged by Mr. Bolus in his paper on new *Ericaceæ* published in this Journal for 1894, in which he is commemorated by *Erica Guthriei*.

We have seen the first four numbers of a new work on the Flora of Japan—*Phanerogamæ et Pteridophytæ Japoniæ iconibus illustrata*—each of which contains five admirably executed plates, with text in Japanese. It is announced as a monthly publication, but, as sometimes happens nearer home, circumstances have resulted in a less regular issue: the numbers before us are dated respectively Jan. 20, March 25, June 8, and July 30. A similar publication for Cryptogams is issued by Drs. J. Matsumaro and M. Miyoshi.

Dr. Kuntze and others who are addicted to exercises in nomenclature may note the following, which occurred at a very recent meeting of the Royal Horticultural Society. A beautiful basket of *Pinguicula caudata*, which had received a "cultural commendation," attracted the attention of two ladies. "But what is it called?" "Ah! here is the name on this white ticket!"; and the elder proceeded to write with due care and some deliberation at the dictation of the younger the binomial "*cultural commendation*." Scarcely was it written when the Society's familiar blue label was discovered in front of the basket. "Oh!" said the younger lady, "here is another ticket; this seems to be the proper name, *Pingulata cantata*—they are always changing the names, you know!"

ERRATA.

P. 87, l. 18 from bottom, for "Robier" read "Robien."
P. 143, l. 10, for "203" read "23."
P. 329, l. 6 from bottom, for "only" read "any."
P. 400, l. 7 from top, for "*Bainesii*" read "*Bainii*."
P. 490, lines 13 and 20, for "Brewer" read "Bower."

Plates 403 and 404 are incorrectly lettered 402 and 403 respectively; and "404" should be substituted for "403" in the heading and throughout the references in Dr. Rendle's paper on *Xyris* (pp. 497–509).

INDEX.

For Classified Articles, see—Articles in Journals; County Records; Obituary; Reviews. New genera, species, and varieties published in this volume, as well as new names, are distinguished by an asterisk.

Acanthopale, 447
Afghanistan, new moss from, 241
Agaricus velutipes, 46
Agastache, 484
Agrostis aristulifera,* 381; Schlechteri,* 380
Albuca affinis,* 251
Alepidea natalensis,* 255
Alga-flora of Cambridgeshire (tt. 394–6), 49, 106, 216, 263, 291; new British, 289 (t. 399)
Allen, Grant, 496
Allium Schœnoprasum, 327
Alopecurus pronus, 358
Alsine in British Flora, 317; rupicola,* 318
American Nomenclature, 287
Andrews, C. R. P., Draba muralis, 275
Apodachlya, 198, 339 (t. 400)
Apodya, 199
Apospory, 142
Aptosimum Randii,* 171
Araujia albens, 237
Arber, E. A. N., Relationships of Indefinite Inflorescences, 160
Arcyria, 152
Arenaria balearica, 328, 360
Arthur's 'Living Plants' (rev.), 137
ARTICLES IN JOURNALS:—
Annals of Botany, 45, 47, 188, 333, 444
Ann. Scott. Nat. Hist., 495
Bot. Centralblatt, 45, 93, 139, 188, 236, 285, 334, 366, 444, 495, 525
Bot. Gazette, 45, 94, 139, 188, 236, 285, 334, 366, 444, 525
Bot. Notiser, 94, 139, 236, 285, 495, 525
Bot. Zeitung, 45, 140, 334, 366, 445, 495, 525
Bull. Bot. Soc. Belgique, 366
Bull. de l'Herb. Boissier, 94, 140, 188, 236, 285, 334, 366, 445, 495, 525
Bull. Soc. Bot. France, 45, 189, 286, 366, 445
Bull. Torrey Club, 94, 140, 189, 236, 286, 366, 445, 495, 525
Erythea, 45, 94, 140, 189, 236, 286, 334, 366, 445, 525
Gardeners' Chronicle, 45, 94, 189, 236, 366, 448, 495, 525
Icones Plantarum, 192
Journal de Botanique, 45, 94, 95, 140, 189, 286, 334, 495, 525
Journ. Linn. Soc. 236, 366, 525
Malpighia, 140, 286, 445
Nuovo Giorn. Bot. Ital., 140, 445
Oesterr. Bot. Zeitschrift, 45, 94, 140, 189, 286, 334, 367, 445, 495, 526
Pharmaceutical Journal, 94
Philosophical Transactions, 46
Rhodora, 95, 286, 334, 367, 445, 495, 526
Trans. Linn. Soc., 140
Trans. Nat. Hist. Soc. Glasgow, 143
Ascherson's 'Mitteleuropäischen Flora' (rev.), 187
Asplenium Ruta-muraria, 361
Aster uliginosus,* 252
Athyrium Filix-fœmina var., 142
Australian Flora, 36; Myrtaceæ, 247

Badhamia, 146
Bagnall, J. E., Merionethshire Mosses, 175; Buxbaumia aphylla, 226; Staffordshire Mosses, 441
Bailey's (L. H.) 'Principles of Agriculture,' 238; 'Evolution of Fruits' (rev.), 279
Baker, E. G., Somali-land plants, 59, 60, 62, 64; Malvaviscus, 344; Niedenzu's 'Malpighia' (rev.), 363; Rhodesian Polypetalæ, 422
Barnes' Plant Life' (rev.), 137
Barton, E. S., 'Phycological Memoirs' (rev.), 284
Batters, E. A. L., J. H. Pollexfen, 438

Bauer's (Francis) 'Exotick Plants,' 181
Benbow, J., Middlesex Rubi, 255; Middlesex Mosses, 441
Bennett, A., Psamma baltica, 135, 181; Sussex Plants, 135; Cumberland Plants, 225; Cambridge Plants, 243; Epipactis atrorubens, 274, 359; E. Anglian Botany, 322; Flora of Kent, 340; Selinum Carvifolia, 359; Alopecurus pronus, 358
Berkheya maritima,* 253
Bettefreund's 'Flora Argentina,' 96
Bibliographical Notes, 33, 181, 390, 481
Biffen, R. H., on Agaricus velutipes, 46
Biographical Index of Botanists, 77 (rev.), 235
Blake, J. B., 87
Bley's 'Botanisches Bilderbuch,' 48
Boerlage's Buitenzorg Garden, 240
Boulger, G. S., Biographical Index, 77, 235 (rev.)
Brachystegia Randii, 433
Braithwaite's 'British Moss Flora,' 286
Bretschneider's Bot. Discoveries in China (rev.), 86
Brit. Mus. Bot. Dept. Report, 1897, 134; Herbarium, 336
Britten, J., Stellaria media, 37; Irish Botany (rev.), 39; Kew Bulletin Papers (rev.), 44; notes on Saxifraga, 66; Bretschneider's 'Bot. Discoveries in China' (rev.), 86; Biographical Index, 77, 235, (rev.); Lamium molle, 130; Chinese Plants, 135; Primula scotica, 136; Francis Bauer's 'Exotick Plants,' 181; S. Curtis's 'Beauties of Flora,' 183; Hodgson's 'Flora of Cumberland' (rev.), 184; Cumberland Plants, 225; Australian Myrtaceæ, 247; Gladiolus oppositiflorus, 273; Marsea, 274; Draba muralis, 275; Floras of Kent and Cheshire (rev.), 275; Glasgow Catalogue (rev.), 276; Plantago Psyllium, 328; Kew Library Catalogue (rev.), 329; Marshall Ward on Craterostigma (rev.), 332; Kew Bulletin (rev.), 399; Question of Authorship, 419; Frasers' Catalogues, 481; Linaria, 488; Hierochloe, 489; Two Reprints, 493; Gnaphalium luteo-album, 520
Brotherus' Bryology of S. India, 368
Bryum arcticum, 309
Buda media, 341
Bulbochæte ellipsospora,* 54
Burkill's African Acanthaceæ (rev.), 491
Burtt on Coniferæ, 527
Buxbaumia aphylla, 226

Campbell's (D. H.), 'Evolution of Plants' (rev.), 281
Capriola, 378
Card's 'Bush-Fruits' (rev.), 279
Carex acuta, 250; hæmatosaccus, 238; Œderi, 250; rhynchophysa, 368; Wahlenbergiana, 238
Carruthers, J. B., 46
Caruel, T., 258
Casey's 'Riviera Nature Notes,' 94
Cerastium, critical notes on (alphabetically arranged, A—F), 116, 209, 310, 474; arcticum, 38
'Ceylon, Flora of,' 191
Chenopodium capitatum, 85
Chinese plants, 86, 135
Chirita Forbesii,* 175
Chloris somalensis,* 66
Chlorophytum Haygarthii,* 254
Chromotaxia, 180
Cineraria Eenii,* 402
Clarke's (C. B.) African Acanthaceæ (rev.), 491
Clarke, W. A., Curtis's Flora Londinensis, 390
Clasmatocolea cuneifolia, 38, 227
Clathrocystis roseo-persicinus, 266
Closterium laterale, 112; peracerosum var. elegans,* 111
Cochlearia anglica, 340
Coleus cuneatus,* 64; speciosus,* 64
Colgan's 'Cybele Hibernica' (rev.), 39, 315
Colour, Terms used to denote, 97, 180, 226
Combretum rhodesicum,* 435
Convolvulus omanensis,* 405
Cosmarium anceps, 114; basilicum,* 218
Cotes' 'Dante's Garden' (rev.), 47
County Records:—
  Bedford, 275
  Berks, 84
  Brecon, 17, 193
  Cambridge, 49, 106, 216, 243, 262, 291, 326, 359, 520
  Carnarvon, 85, 132, 273
  Chester, 275, 289, 360, 441
  Cumberland, 37, 184, 225

Derby, 421
Devon, 361, 524
Dorset, 359
Gloucester, 274, 309, 417
Hants, 181, 396, 440, 496, 524
Hereford, 196, 421
Kent, 275, 319, 340, 359, 360, 361, 496
Lancashire, 11, 375, 465, 509
Leicester, 136, 274
Lincoln, 326, 360
Merioneth, 175
Middlesex, 225, 328, 441, 496
Norfolk, 135, 181, 251, 519, 521
Nottingham, 144
Radnor, 17, 193
Salop, 198, 338
Somerset, 287, 408, 417, 489, 524
Stafford, 440
Suffolk, 322, 521
Surrey, 85, 249, 273, 340, 357, 496
Sussex, 136, 189, 287, 328, 360, 496
Worcester, 226
York, 195
Crassulaceæ, Canarian, 201, 395
Craterostigma pumilum, 332
Crepis Gillii,* 170
Cullumia Massoni,* 404
Curtis's (Samuel) 'Beauties of Flora,' 183; 'Flora Londinensis,' 390
Cybele Hibernica, remarks on, 269, 315, 356, 396.

Dale's 'Craterostigma' (rev.), 332
Dalgado's 'Flora de Goa,' 96
'Dante's Garden,' 47
Daubeny's 'Strength and Decay of Nations,' 239
De Tabley's 'Flora of Cheshire' (rev.), 275
De Wildeman's 'Flore du Congo,' 152
Dendrobium Hollrungii var. australiense,* 339
Desmids, Variations in, 334
Detris smaragdina,* 379; tenella,* 370
Diatoms of St. Vincent, 411
Dichotrichum papuanum,* 174
Dicoma somalense,* 60
Dicranum montanum, 274
Didymium, 149
Diseases of Plants, 362
Dixon, H. N., Carnarvonshire Mosses, 132, 273; West Highland Mosses, 300; Weisia cristata, 375
Dod, A. H. W., Cheshire Plants, 441
Dolichos stipulosus var. Randii,* 432; tricostatus,* 431
Donegal Plants, 40, 70, 125
Dowker, G., 496
Draba muralis, 275
Drosera anglica, 524
Druce on Carex rhynchophysa, 368
DuPort, J. M., 192
Durand's 'Flore du Congo,' 152
Dyer, W. T. T., appointed K.C.M.G., 96
Dysphinctium, 114

Eenia* damarensis,* 373 (t. 401)
Ehrharta pusilla var. inæquiglumis,* 380; Schlechteri,* 380
Ekebergia arborea,* 427
Epipactis atrorubens, 274, 328, 359
Eria Fitzalani, 339
Eugenia paniculata, 247
Euphrasia, 386, 524
Eurya amplexicaulis,* 168
Euryops Osteospermum,* 403
Evans' (E.) 'Botany for Beginners' (rev.), 491
Evans, M. S., Natal Plants, 251, 446
Ewing's 'Glasgow Catalogue' (rev.), 275

Fadogia humilis,* 252
Farmer's Introduction to Botany (rev.), 490
Farwell, O. A., Habenaria viridis var. bracteata, 38
Felicia drakenbergensis,* 253; pinnatifida,* 253
Flower, T. B., 496
Frasers' Catalogues, 481
Fry, D., Bristol Plants, 417; Pyrus latifolia, 489
Fryer, A., Potamogeton Drucei,* 524; his 'Potamogetons,' 96
Fuligo, 148; ellipsospora, 148

Galium sylvestre, 273
Ganong's 'Teaching Botanist' (rev.), 489
Geigeria Eenii,* 373; pubescens,* 374; Randii,* 374
Gentiana uliginosa, 386
Geography, Botanical, 43
Gepp, A., Apodochlya, 198, 338 (t. 400); Braithwaite's 'British Moss Flora,' 286
Giulianettia, 368
Gladiolus flabellifer, 273; marmoratus, 273; oppositiflorus, 273
Glaux, fertilization of, 190

Glœochæte Wittrockiana, 264
Gnaphalium luteo-album, 520
Goss, H., Orchis cruenta, 37
Graebner's 'Mitteleuropäischen Flora' (rev.), 187
Gravis on Tradescantia (rev.), 228
Gray, Peter, 336
Grescescu's Flora of Roumania, 47
Grove, Edmund, St. Vincent Diatoms, 411
Groves, H. & J., Origin of British Flora (rev.), 441
Guthrie, F., 528

Habenaria viridis var. bracteata, 38
Hæmacanthus * coccineus,* 63
Hanbury's 'Flora of Kent' (rev.), 275
Hapalospongidion, 236
Harkness's 'Californian Fungi' (rev.), 397
Hart, H. C., his 'Flora of Donegal' (rev.), 40; Donegal Plants, 70, 125, 152
Heeria insignis var. reticulata,* 428
Helichrysum Danaë,* 371; homilochrysum,* 371; marmarolepis,* 370; mimetes,* 372; somalense,* 60
Henslow's 'Medical Works of XIV. Cent.,' 239
Hepaticæ, Scottish, 274, 348; Pearson's book on British, 288
Herposteiron repens, 57
Hevea, 152
Hibiscus rhodesicus,* 424
Hieracium cæsium var. coracinum,* 35; cymbifolium,* 421; sciaphilum var. pulchrius,* 35; Scottish, 385; Linton's set of, 526
Hiern, W. P., Somali-land Plants, 58; his Welwitsch Catalogue, 191; Alsine in British Flora, 317; Capriola, 378
Hierochloe borealis, 328, 489
Hildebrandtia (t. 402), 405; obcordata,* 406; undulata,* 406
Hodgson's 'Flora of Cumberland' (rev.), 184
Holmes, E. M., Kentish Plants, 361; Hants Plants, 396
Holothrix Randii,* 209
Hörmann's 'Kontinuität der Atomverkettung' (rev.), 364
Husnot's 'Graminées' (rev.), 188
Hybrid Orchid, 360
Hypnum Wilsoni, 360

Icones Selectæ Horti Thenensis, 496
Indian Botany, History of, 454
Inflorescences, indefinite, 160
Irish Botany, 39, 70, 125, 152, 190, 269, 315, 327, 356, 368, 396

Jackson, A. B., Dicranum montanum, 274; Rubus Kaltenbachii, 136
Jackson, B. D., Legré's 'Botanique en Provence' (rev.), 88; Latin Terms used to denote Colour, 97, 226; 'Histoire de la Pomme de terre' (rev.), 232; 'Hugues Solier' (rev.), 283
Jameson's Moss Herbarium, 336
Japanese Botany, 528
Jekyll's 'Wood and Garden,' 190
Juniperus Bermudiana and J. virginiana, 1

Kalanchoe glandulosa var. rhodesica,* 434
Kew Bulletin, 44, 143, 240, 288, 397, 419, 446, 526; Library Catalogue (rev.), 329
Kickxia, 487
King, Sir George, Early History of Indian Botany, 454

Lactuca Watsoniana, 171
Lamium molle (album β. integrifolium), 130, 180
Lamproderma, 150
Lasiostelma somalense,* 61
Le Jolis's 'Protestation,' 95
Lee, John, 144
Leebody, M. J., Stachys Betonica, 273
Legré's 'Pena et Lobel' (rev.), 88; 'Hugues de Solier' (rev.), 283
Lepidoderma, 149
Lepidostrobus, 140
Lessertia stipulata,* 430
Ley, A., New Hieracia, 35
Linaria, 488
Lindley Library Catalogue, 47
Linnean Society, 46, 140, 189, 237, 288, 334, 367, 527
Lister, A., Mycetozoa (t. 398), 145, 463
Lobel, Mathias de, 88
Lubbock's 'Buds and Stipules,' 239
Lyell's Moss Herbarium, 143

MacDougal's 'Living Plants' (rev.), 137

Macvicar, S., Hepaticæ of Moidart, 348
Maiden's 'Grasses of N. S. Wales' (rev.), 186
Malpighia, 363
Malvaviscus, 344; arboreus, 344; brevibracteatus,* 347; cinereus, 347; Polakowskyi,* 346
Marsea, 274
Marshall, E. S., Cerastium arcticum, 38; Berks Plants, 84; N. Hants Plants, 181; West Surrey Plants, 249; his 'Flora of Kent' (rev.), 275; Irish Plants, 269, 356; Thesium humifusum, 360
Maslen, A. J., on Lepidostrobus, 140
Massee's 'Plant Diseases' (rev.), 362
Masters, M. T., Juniperus Bermudiana, 1
Melhania Randii,* 425
Melvill, J. C., Chenopodium capitatum, 85
Merismopedia elegans, 265
Mesotænium Kramstai, 110
Metalasia Massoni,* 372
Miller, W. F., Sagina apetala, 361
Mimicry, 448
Minuartia, 320; peploides,* 322; rubella,* 320; sedoides,* 321; stricta,* 320; tenuifolia,* 321; verna,* 320
Monington, H. W., Physcomitrium sphærium, 85
Moore, S., on Australian Flora, 36; Somali-land Plants, 60, 62, 63, 65; Hörmann's 'Kontinuität de Atomverkettung' (rev.), 364; Alabastra diversa, 168, 369, 401 (tt. 401–2); 'African Acanthaceæ' (rev.), 491
Moseleya, 192
Mosses, Lancashire, 11, 465, 509; Carnarvonshire, 132, 273; Merionethshire, 175; Middlesex, 441; West Highland, 300; Indian, 368; Staffordshire, 440; Exchange Club, 282
Mougeotia paludosa,* 108
Müller, Carl, 152
Murray, G. R. M., Report Bot. Dept. Brit. Mus. 1897, 134
Murray, R. P., Canarian Crassulaceæ, 201, 395
Mycetozoa, Notes on (t. 398), 145, 463
Myrtaceæ, Australian, 247
Myrtus nitida, 248

Naias, 367
Nanomitrium, 141
Newspaper Botany, 142
Niedenzu's 'Malpighia' (rev.), 363
Nomenclature, American, 287

Obituary:—
Allen, Grant, 496
Caruel, Teodoro, 258
Dowker, George, 496
Flower, Thomas Bruges, 496
Gray, Peter, 336
Guthrie, F., 528
Lee, John, 144
Pamplin, William, 521
Pollexfen, John Hutton, 438
Seppitt, Henry Thomas, 240
Traill, Catharine Parr, 448
Wallace, Alexander, 496
Whitehead, John, 526
Wollaston, George Buchanan, 447
Œdogonium crassipellitum,* 55
Oldenlandia fasciculata,* 59; Schimperi var. somalense,* 59
Omphalogramma, 45
Oncinotis inandensis,* 254
Ophiocytium, 106
Orchids, Queensland, 339; hybrid, 360
Orchis cruenta, 37; hircina, 279, 343; purpurea, 343
Oscillarioideæ from Plankton, 337
Oscillatoria capitata,* 337 (t. 400); decolorata,* 263
Othonna ambifaria,* 403
Otomeria calycina,* 58; rupestris,* 59
Otostegia modesta,* 65

Pamplin, William, 521
Pavetta Phillipsiæ,* 369
Pearson, W. H., Clasmatocolea cuneifolia, 38; Scottish Hepaticæ, 274; his book on Hepaticæ, 447
Peirson, H., Hybrid Orchid, 360
Pena, Pierre, 88
Pentaschistis patuliflora,* 381
Pentzia Eenii,* 401 (t. 401)
Pertusaria incarnata, 440
Petiver's Exsiccatæ, 227
Phillips, R. W., William Pamplin, 521
Phyllactinia (t. 403), 449
Physarum, 146; echinosporum,* 147
Physcomitrium sphærium, 85

Pierre's 'Flore Forestière,' 48
Pilinia stagnalis,* 107
Pithophora Œdogonia var. polyspora,* 289 (t. 399)
Plantago Psyllium, 328
Platymitra, 240
Pollexfen, J. H., 438
Porphyridium cruentum, 266
Potamogeton Drucei,* 524
'Potamogetons,' Fryer's, 96
Pratt's 'Flowering Plants' (re-issue), 336, 494
Primula Gillii, 134; ramalana, 135; scotica, 136
Protoderma viride, 58
Psamma baltica, 135, 181
Pterodiscus saccatus,* 62; undulatus,* 62
Purchas, W. H., Hieracium cymbifolium,* 421
Pyrus latifolia, 489

Queensland Orchids, 339

Radiofilum flavescens,* 57
Rand, R. F., Notes from Rhodesia, 204, 422
Raunkiær's 'Danske Blomsterplanters' (rev.), 333
Reid's 'Origin of British Flora' (rev.), 441
Rendle, A. B., Steudel's 'Synopsis Glumacearum,' 33; Vines' 'Text-book' (rev.), 40; Chloris somalensis,* 66; Wettstein's 'Geographisch-Morphologischen Methode' (rev.), 92; 'Plant Physiology' (rev.), 137; 'Books on Grasses' (rev.), 186; 'Native American Fruits' (rev.), 279; Campbell's 'Evolution of Plants' (rev.), 281; New British Alga (t. 399), 289; Raunkiær's 'Danske Blomsterplanters' (rev.), 333; two Queensland Orchids, 339; on Naias, 367; S. African Grasses, 380; 'Teaching of Botany' (rev.), 489; Notes on Xyris, 497 (t. 404)
Reviews:—
Cybele Hibernica. N. Colgan and R. W. Scully, 39
Flora of Donegal. H. C. Hart, 40
Text-book of Botany. S. H. Vines, 41
Pflanzen-Geographie. A. F. W. Schimper, 43
Papers from Kew Bulletin, 44
European Bot. Discoveries in China. E. Bretschneider, 86
Pierre Pena and Matthias de Lobel. L. Legré, 88
Geographisch-morphologischen Methode. R. v. Wettstein, 92
Living Plants. J. C. Arthur and D. T. MacDougal, 137
Plant Life. C. R. Barnes, 137
Bot. Mittheilungen. S. Schwendener, 138
Flora of Cumberland. W. Hodgson, 185
Grasses of N. S. Wales. J. H. Maiden, 186
Mitteleuropäischen Flora. P. Ascherson and P. Graebner, 187
Graminées, 188
Tradescantia. A. Gravis, 228
La Pomme de terre. E. Roze, 232
Index of British Botanists (suppl.). J. Britten and G. S. Boulger, 235
Flora of Kent. F. J. Hanbury and E. S. Marshall, 275
Flora of Cheshire. Lord de Tabley, 275
Glasgow Catalogue. P. Ewing, 275
Evolution of Native Fruits. L. H. Bailey, 279
Bush-Fruits. F. W. Card, 280
Evolution of Plants. D. H. Campbell, 281
Moss Exchange Club Reports, 282
Hugues de Solier. L. Legré, 283
Phycological Memoirs. D. A. Saunders, 284
Kew Library Catalogue, 329
Crateostigma. Ward and Dale, 332
Danske Blomsterplanters. C. Raunkiær, 333
Plant Diseases. G. Massee, 362
Malpighia. F. Niedenzu, 363
Kontinuität de Atomverkettung. G. Hörmann, 364
Californian Fungi. Harkness, 397
Kew Bulletin. 399
Origin of British Flora. C. Reid, 441
Teaching Botanists. W. F. Ganong, 489
Introduction to Botany. J. B. Farmer, 490
Botany for Beginners. E. Evans, 491

African Acanthaceæ. I. H. Burkill and C. B. Clarke, 491
Sowerby's English Botany, 493
Pratt's Flowering Plants, 494
Rhigozum linifolium,* 172
Rhodesia, Notes from, 204, 422
Rhus trifoliolata,* 429; Welwitschii var. angustifolia,* 429
'Riviera Nature Notes,' 94
Robinson, James, 87
Robinson, W., Arenaria balearica, 360
Rogers, W. M., Radnor and Brecon Plants, 17, 193
Roze's 'Histoire de la Pomme de Terre' (rev.), 232
Rubi, Radnor and Brecon, 193; Scottish, 225, 384; Middlesex, 255
Rubus Bakeri, 39; Buckuallii,* 389; Kaltenbachii, 136

Saccardo, P. A., Chromotaxia, 180; Petiver's Exsiccatæ, 227; his 'Index,' 96
Sagina apetala, 361
Salmon, C. E., Rubus Bakeri, 39; Somerset Plants, 408; Euphrasia, 524
Salmon, E. S., on Nanomitrium, 141; Tortula media* (t. 397), 241; Structures in Phyllactinia, 449 (t. 403)
Sanguinaria, 378
Saunders, D. A., 'Phycological Memoirs' (rev.), 284
Saunders, J., North Norfolk Plants, 519; Drosera anglica, 524
Saxifraga, notes on, 66; Gillii, 68
Schimper's 'Pflanzen-Geographie' (rev.), 43
Schlechter, R., Lasiostelma somalense,* 61
Schwendener's 'Bot. Mittheilungen' (rev.), 137
Scilla palustris,* 251
Scottish Plants, 38, 39, 136, 143, 225, 274, 276, 287, 309, 328, 348, 361, 383, 478
Scully's 'Cybele Hibernica' (rev.), 39, 315
Sedum lancerottense,* 201
Selinum Carvifolia, 244, 327, 359
Sempervivum arboreum, 202; barbatum, 203; hierrense,* 395; Meyerheimii, 203; percarneum,* 201; tabulæforme, 203; viscatum, 204
Senecio Randii,* 402
Shelley's 'Chats about Microscope,' 367
Shoolbred, W. A., Scottish Plants, 383; North Uist Plants, 478
Sideranthus, 483
Smith, W. G., Massee's 'Plant Diseases' (rev.), 362; Californian Fungi (rev.), 397
Solier, Hugues de (rev.), 283
Somali-land Plants, 58, 332, 369
Sonchus macer,* 404
Soppitt, H. T., 240
Sowerby's English Botany (re-issue), 288, 493
Spirogyra pellucida, 109
Stachys Betonica, 273
Stansfield, F. W., on Apospory, 142
Stapfia, 45; cylindrica, 237 (= Neostapfia)
Staurastrum paxilliferum,* 219
Stellaria media, 37
Stemonitis, 150
Step, E., on Glaux, 190
Steudel's 'Synopsis,' dates of, 33
Stewart, S. A., Irish Plants, 396
Synechococcus roseo-purpureus,* 265

Tansley, A. G., 'Tradescantia' (rev.), 229
Tephrosia radicans var. rhodesica,* 430
Terminalia Randii,* 435
Thesium humifusum, 359
Thuidium, 305
Tortula media* (t. 397), 241
Tradescantia (rev.), 228
Tragopogon pratensis, 342
Traill, C. P., 448
Trichia, 151
Trichosporum breviflorum,* 173; Forbesii,* 172; nummularium,* 173
Trimen's Flora of Ceylon, 191
Tryphostemma apetalum var. serratum,* 437; pedatum,* 436
Turræa Randii,* 427

Urban's 'Symbolæ Antillanæ,' 48
Urochlæna major,* 382

Velezia, 25; fasciculata, 31; hispida, 32; quadridentata, 31; rigida, 27
Vernonia Randii,* 369
Vines' 'Text-book of Botany' (rev.), 41

Waddell, C. H., Scottish Rubi, 225; Clasmatocolea cuneifolia, 227
Wallace, Alexander, 496
Ward's (M.) Craterostigma (rev.), 332
Warren's 'Flora of Cheshire' (rev.), 275
Watson Exchange Club, 335
Wedelia diversipapposa,* 401
Weisia crispata in Britain, 375
Welwitsch's African Plants, 191, 280
West, G. S., Alga-flora of Cambridgeshire (tt. 394–6), 49, 106, 216, 262, 291; Variations in Desmids, 334
West, W., Jun., Galium sylvestre, 273; new British Alga (t. 399), 289; Oscillarioideæ from Plankton (t. 400), 337
Wettstein's 'Geographisch-morphologischen Methode' (rev.), 92
Wheldon, J. A., Lancashire Mosses, 11, 465, 509; Hypnum Wilsoni, 360
White, J. W., New British Rubus, 389; Bristol Plants, 417
Whitehead, John, 526
Whitwell, W., Cheshire Plants, 360; Asplenium Ruta-muraria, 361
Wilkinson, W. H., Pertusaria incarnata, 440
Williams, F. N., Velezia, 25; Notes on Cerastium, 116, 209, 310, 474; Teodoro Caruel, 258
Wilson, A., Lancashire Mosses, 465, 509
Wocke's 'Die Algen-Pflanzen,' 335
Wollaston, G. B., 447
Wood, J. M., Natal Plants, 251, 446
Wyomingia, 286

Xyris, notes on (t. 404); borneensis,* 506; bracteata, 503; complanata, 500; conocephala, 499; erubescens, 508; flexifolia, 501; flexuosa, 499; gracilis, 501; gracillima, 501; juncea, 502; lacera, 504; lanata, 504; laxiflora, 504; Lobbii,* 506; marginata,* 503; neocaledonica,* 507; operculata, 502; paludosa, 500; Pancheri,* 507; pauciflora, 500; Ridleyi,* 505; Thompsoni,* 508; ustulata, 504

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